

EVALUTION OF MANAGEMENT MEASURES OF SOFTWARE DEVELOPMENT

VOLUME 2: DATA DESCRIPTION

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Greenbelt, Maryland 20771

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EVALUATION OF MANAGEMENT MEASURES OF SOFTWARE DEVELOPMENT

VOLUME 2: DATA DESCRIPTION

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Space Administration

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FOREWORD

The Software Engineering Laboratory (SEL) is an organization sponsored by the National Aeronautics and Space Administration, Goddard Space Flight Center (NASA/GSFC) and created for the purpose of investigating the effectiveness of software engineering technologies when applied to the development of applications software. The SEL was created in 1977 and has three primary organizational members:

NASA/GSFC (Systems Development and Analysis Branch)

The University of Maryland (Computer Sciences Department)

Computer Sciences Corporation (Flight Systems Operation)

The goals of the SEL are (1) to understand the software development process in the GSFC environment; (2) to measure the effect of various methodologies, tools, and models on this process; and (3) to identify and then to apply successful development practices. The activities, findings, and recommendations of the SEL are recorded in the Software Engineering Laboratory Series, a continuing series of reports that includes this document. A version of this document was also issued as Computer Sciences Corporation document CSC/TM-82/6063.

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ABSTRACT

This document reports the results of an evaluation of a large set of software development measures relevant to the Goddard Space Flight Center (GSFC) environment. Volume 1 explains the conceptual model, the data classification scheme, and the analytic procedures. This volume also summarizes the analytic results and recommends specific software measures for collection and monitoring. Volume 2 presents a detailed description of the data analyzed including definitions of measures, lists of values, and summary statistics. This volume also reproduces in full the results of the computer analyses.

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SECTION 1 - INTRODUCTION

This is the second volume of a two-part document that reports the results of evaluating a large set of software development measures relevant to the Goddard Space Flight Center (GSFC) environment. Volume 1 explains the conceptual model, data classification scheme, and analytic procedures. That volume also summarizes the analytic results, recommends specific software measures for collection and monitoring, and reproduces the results of the computer analyses.

Volume 2 (this volume) presents a detailed description of the data. Although the information contained in Volume 2 was essential to the development of the explanation and summary presented in Volume 1, it is not essential to the understanding of that explanation and summary. However, Volume 2 is useful in its own right as a source of data and reference for future research.

Information in this volume is contained in one appendix. Appendix A presents a detailed description of the data analyzed, including definitions of measures, lists of values, summary statistics, and graphs. This appendix is organized according to the classes of measures defined in Section 2.2 of Volume 1.

APPENDIX A - DESCRIPTION OF SEL SOFTWARE
DEVELOPMENT MEASURES AND DATA

A.0 INTRODUCTION

A.0.1 GENERAL INFORMATION

This appendix contains a detailed description of a set of software development measures used by the SEL. However, no attempt is made to describe each measure in detail, and no detailed explanation of how the values are obtained is provided. This information will be provided in a future SEL document. A brief phrase is used to indicate the general meaning of each measure in this particular document, although some examples are provided in the text to give the the reader a better understanding of the measures.

Table A.0-1 lists seven major classes of measures discussed in this document. The table also gives the subsection of the appendix in which each class of measures is described, the Appendix A page number referencing each category, the abbreviation code for each class of measures used in tables and figures, and the number of measures and the number of combinations of measures in each class. Table A.0-2 contains a cross-reference of the seven major classes of measures to the four components of the software development model used by the SEL.

Not all the measures discussed in this appendix are mutually exclusive. Some are repeated in more than one class--for the most part, scaled differently to suit the input requirements of a model or the requirements of their intended use. Of the 747 measures listed here, 91 have been left undefined for later expansion; 68 are indicated combinations (weighted sums); approximately 150 are derived by combining several measures; and approximately 100 in the models class are repeated in some form. These numbers indicate a maximum of approximately 300 mutually exclusive measures.

Table A.0-1. Classes of Measures (1 of 2)

<u>Section</u>	<u>Category</u>	<u>Page No.</u>	<u>Abbrevi- ation</u>	<u>Number of Measures</u>	<u>Sums</u>
A.1	Software Engineering	14			
A.1.1	Practices and Tech- niques	14	MT	30	4
A.1.2	Tools	28	TS	15	1
A.1.3	Documentation	40	DC	15	1
A.1.4	Software Engineering Methodology	52	SE	0	1
A.2	Development Team Ability	63			
A.2.1	Experience With Ap- plication	63	AP	15	4
A.2.2	Effectiveness of Management	75	MG	35	13
A.2.3	Performance of Team	94	PF	40	0
A.2.4	Ability of Team	109	AB	0	12
A.3	Difficulty of Proj- ect	120			
A.3.1	Complexity of Prob- lem	120	CP	15	5
A.3.2	Internal Influences on Project	132	IN	15	4
A.3.3	External Influences on Project	144	EX	20	7
A.3.4	Difficulty of Project	158	DF	0	1
A.4	Process and Product Characteristics	169			
A.4.1	Resources Available	169	RA	20	5
A.4.2	Software Product	181	PR	20	4
A.4.3	Product/Process Per- formance	193	PP	15	3

Table A.0-1. Classes of Measures (2 of 2)

<u>Section</u>	<u>Category</u>	<u>Page No.</u>	<u>Abbrevi- ation</u>	<u>Number of Measures</u>	<u>Sums</u>
A.5	Development Team Background	205			
A.5.1	Team Rank	205	RK	40	0
A.5.2	Years of Profes- sional Experience	224	YP	40	0
A.5.3	Years of Appli- cable Experience	236	YA	40	0
A.5.4	Years of Environ- ment Experience	251	YE	40	0
A.6	Models	266			
A.6.1	Walston-Felix	266	WF	80	2
A.6.2	PRICE S3	289	PS	20	1
A.6.3	COCOMO	302	CO	15	0
A.7	Additional Detail	305			
A.7.1	Miscellaneous	306	MS	40	0
A.7.2	Code Breakdown	320	SW	90	0
A.7.3	Estimated Statis- tics	343	ES	19	0

Table A.0-2. Class Cross-Reference With Components of Software Development Model

<u>Category</u>	<u>Problem</u>	<u>Environ- ment</u>	<u>Process</u>	<u>Product</u>
Software Engineering				
Practices and Techniques			x	
Tools			x	
Documentation			x	
Dev. Team Ability				
Experience With Application		x		
Effectiveness of Management		x		
Performance of Team		x		
Difficulty of Project				
Complexity of Problem	x			
Internal Influences		x		
External Influences		x		
Process and Product				
Characteristics				
Resources Available		x		
Software Product			x	x
Product/Process Performance			x	x
Dev. Team Background				
Team Rank		x		
Years' Professional Experience		x		
Years' Applicable Experience		x		
Years' Environment Experience		x		
Models				
Walston-Felix	x	x	x	x
PRICE S3	x	x	x	x
COCOMO	x	x	x	x
Additional Detail				
Miscellaneous			x	x
Code Breakdown			x	x
Estimated Statistics			x	x

Although this document does not describe each measure fully, each subsection characterizes its class of measures in the following terms, which are explained below:

- Objective or subjective
- Absolute or relative
- Explicit or derived
- Dynamic or static
- Predictive or explanatory

Objective/Subjective. Measures are objective when they are counts of things that exist, are expended, or are used. Examples include number of input data sets, number of computer hours expended, or number of graphics terminals available. Measures are subjective when a person (without the benefit of absolutely objective data) interprets a result or an effect and then ranks or rates it relative to similar results or effects. However, some objective measures may be examined to make a subjective evaluation. For example, there is no objective measure of how well a development project leader knows the details of his project. The project leader can only be judged by observing his presentations, reading his/her progress reports, and observing how the project leader performs project tasks. This project leader's performance can then be compared to the performance of other project leaders.

Some objective measures are restated as ranks for convenience and to highlight significant distinctions. For example, years of experience (YOE) may be scaled from 1 to 3 as follows. Less than 2 YOE is assigned a value of 1; between 2 and 5 YOE is assigned a value of 2; and greater than 5 YOE is assigned a value of 3. This scale may be useful in one environment; however, it may not be useful in environments weighted with very junior (less than 5 YOE) or very senior (more than 5 YOE) personnel. Although such rating

scales are arbitrarily defined, an appropriately defined scale can be more easily understood and applied than the raw data itself can.

Absolute/Relative. Measures are absolute when nothing can change them (for example, number of data sets used by a completed software product). When another case is added to an absolute measure category, none of the other cases is affected. Measures are relative when a whole measure category has to be reevaluated each time a new case is added or when scaling criteria change. With sufficient experience and the consistent application of rating criteria, the need to re-evaluate relative measures diminishes. Objective measures are frequently absolute. Subjective measures are always relative. Objective measures are relative only in the sense of how things are scaled or counted. For example, it is not clear what executable statements are in different programming languages and what their relationships are to each other on the same and different computers.

Explicit/Derived. Measures are explicit when their values can be obtained directly (for example, the number of FORTRAN subroutines). Measures are derived when two or more measures are combined or some computation is required to form the measure (for example, mean executable statements per FORTRAN subroutine). Objective measures are usually explicit or derived values of interest. Subjective measures are frequently derived from objective data and are scaled in some manner.

Dynamic/Static. Measures are dynamic either when they change during the development process (for example, the size of the software product, no matter how it is measured) or when they are relative (subjective) measures. Measures are static either when they can no longer change (completed product size measures) or when a large enough sample is

obtained to represent the full spectrum, from worst to best, in a relative category.

Predictive/Explanatory. Measures are predictive when, whether or not they work in a model, they can be obtained at points before an occurrence of interest. For example, before implementation starts, the number of data sets and the years of experience of the implementation team are known fairly accurately. Measures are explanatory when they cannot be determined completely or with any accuracy until a development phase or the project itself is complete (for example, number of individuals involved in the project). The predictive measures can be made more accurate when the phase predicted is complete, thereby making the measures explanatory. Typical or average values of explanatory measures, of course, can always be used for prediction.

The terms just discussed are used at the beginning of each subsection to describe its class of measures. The tone of the discussion is that the measures are useful and work; however, exactly how useful they are and how well they work are not completely known. What is known is that they form a very comprehensive set of measures that describes one flight dynamics problem, environment, process, and product.

Throughout the appendix, sums of measures are used to capture the effect of measures that by themselves will fail the test of normality. It is clear that if one or several projects uses practices, techniques, methods, or procedures not used in general by other projects, the test of normality will discard their effect. Therefore, sums are used to incorporate the effect of seldom used or occurring facets of development and to test the possibility that a single measure, derived from several input measures, can be used to describe a particular aspect of development.

A.0.2 APPENDIX ORGANIZATION

Because of the volume of data contained in this appendix, the following organizational information is provided to help the reader use the appendix more effectively.

The description of each of the seven classes of measures, along with the corresponding data for each class, begins on a new page and has a major section number matching the number of the class. For example, the first class of measures, Software Engineering, is described in Section A.1, the second class is described in Section A.2, and so on. The categories within each class have a second-level section number corresponding to the number of the category within the class. For example, the first category of Software Engineering measures, Practices and Techniques, is described in Section A.1.1, the second category in the Software Engineering class is described in Section A.1.2, and so on.

Table A.0-1 on pages A-2 and A-3 is a quick reference to the types and numbers of measures in any class. Table A.0-1 also contains the page number of each section.

Each description of a category of measures begins with the following key:

-- Objective	-- Subjective
-- Absolute	-- Relative
-- Explicit	-- Derived
-- Static	-- Dynamic
-- Predictive	-- Explanatory

where an uppercase X preceding a term indicates that, in general, the category has the character described by the term. The narrative that follows the key indicates how or when the general character of the measures may change and usually contains an example to give the reader a better understanding of the measures.

The last paragraph introduces the description of the measures and the data for 25 developed software systems. Each

category of measures, along with the corresponding data for that category, is described in a series of six tables and four figures. Each table and each figure are labeled with the appropriate subsection number. Both the tables and the figures have a running count number within the subsection (e.g., Table A.1.1-1, Table A.1.1-2, and so on); there are always six tables and four figures for each category.

The first table (Table A.x.x-1) in each subsection contains for each measure

- A code number (CODE) that identifies the measure category and the measure number within the category
- A mnemonic name (MEASURE) that summarizes the meaning of the measure
- An acceptable range (RANGE) of values for the measure in terms of the smallest (LOW) and largest (HIGH) acceptable values
- A brief phrase (DESCRIPTION) to indicate the general meaning of the measure

The second table (Table A.x.x-2) contains for each of the 25 developed software systems in the total sample (1) the 4-digit project code (PRCO) and (2) the raw data for each of the measures in the category that has data associated with it. Within each subsection, the introduction of the raw data indicates whether large values of the measures represent the best or worst of the properties being measured.

The last four tables (Tables A.x.x-3 through A.x.x-6) are paired with figures (Figures A.x.x-1 through A.x.x-4) and represent four samples from the 25 developed software systems. The first sample represents 11 mission projects and is described in Table A.x.x-3 and Figure A.x.x-1. Each mission project developed one or more software systems that

were measured. The 4-digit project codes for the 11 mission projects are

<u>Mission Project</u>	<u>Project Code (PRCO)</u>
1	0100
2	0200
3	0300
4	0400
5	0500
6	0600
7	0700
8	0800
9	0900
10	1000
11	1100

The second sample represents 20 independent software systems. One or more of the 20 independent software systems were developed within one of the 11 mission projects.

Tables A.x.x-4 and Figure A.x.x-2 describe the 20 independent software systems. The 4-digit project codes for the 20 independent software systems are

<u>Independent Software System</u>	<u>Project Code (PRCO)</u>
1	0100
2	0200
3	0300
4	0400
5	0500
6	0610
7	0620
8	0630
9	0710
10	0720
11	0730
12	0740
13	0750
14	0760
15	0770
16	0780
17	0800
18	0900
19	1000
20	1100

The third sample represents 9 large software systems, i.e., more than 30,000 delivered lines of code. Table A.x.x-5 and Figure A.x.x-3 describe the 9 large software systems. The 4-digit project codes for the nine large software systems are

<u>Large Software System</u>	<u>Project Code (PRCO)</u>
1	0100
2	0200
3	0300
4	0400
5	0500
6	0610
7	0730
8	0900
9	1000

The fourth sample represents 11 small software systems, i.e., fewer than 30,000 delivered lines of code. Table A.x.x-6 and Figure A.x.x-4 describe the 11 small software systems. The 4-digit project codes for the 11 small software systems are

<u>Small Software System</u>	<u>Project Code (PRCO)</u>
1	0620
2	0630
3	0710
4	0720
5	0740
6	0750
7	0760
8	0770
9	0780
10	0800
11	1100

The table for each of these four samples contains

- Code number (CODE) of each measure
- Mnemonic name (NAME) of each measure

- Acceptable values (ALLOWED RANGE) for each measure in terms of
 - The smallest (LOW) acceptable value
 - The largest (HIGH) acceptable value
- Actual range (ACTUAL RANGE) of the data in the sample for each measure in terms of
 - The smallest (LOW) value in the sample
 - The first quartile (1ST Q) value of the sample
 - The second quartile (MEDIAN) value of the sample
 - The third quartile (3RD Q) value of the sample
 - The fourth quartile (HIGH) value of the sample
- Average (AVERAGE) value of the sample for each measure
- Standard deviation (STD DEV) of the average value of the sample for each measure
- Average value of the sample minus 1 standard deviation (AVG-SD) for each measure
- Average value of the sample plus 1 standard deviation (AVG+SD) for each measure

The figure for each of the four samples is a cluster map based on the category of measures. Cluster analysis groups projects that are most similar via a Euclidean distance calculation. From 1 to N clusters (or groups) can be defined, where N is the number of projects in the sample. Each project in the sample is represented by a full-figure vertical bar of asterisks. The vertically oriented labels above these bars are the 4-digit project codes. The left-hand axis indicates the number of clusters defined for an appropriate level of similarity. The height of the vertical bars

between two project vertical bars indicates the level of similarity between projects.

Starting at the bottom of the histogram, a continuous horizontal bar of asterisks indicates that all projects are similar at the level indicated by the left-hand axis. Once a break occurs in a horizontal bar, the projects to the left and the projects to the right of the break form clusters; that is, the break indicates that the projects to the left and the projects to the right of the break are no longer similar at the level where the break occurs.

In general, the authors use the cluster maps to find three clusters that represent the category quality in terms of the most, the least, and the typical amount of the quality. The description of the measures and data follows.

A.1 SOFTWARE ENGINEERING CLASS OF MEASURES

The Software Engineering class measures the degree of use of development

- Practices and Techniques (MT01 through MT30).
 - Organization (MT01 and MT02)
 - Design (MT03 through MT14)
 - Coding (MT15 through MT23)
 - Testing (MT24 through MT30)
 - Sums (MT81 through MT84)
- Tools (TS01 through TS15)
 - Sum (TS81)
- Documentation Procedures (DC01 through DC15)
 - Sum (DC81)
- Software Engineering Methodology
 - Sum (SE81)

A.1.1 PRACTICES AND TECHNIQUES

-- -- Objective	-- <u>X</u> --	Subjective
-- -- Absolute	-- <u>X</u> --	Relative
-- -- Explicit	-- <u>X</u> --	Derived
-- -- Static	-- <u>X</u> --	Dynamic
-- -- Predictive	-- <u>X</u> --	Explanatory

This category measures the degree of use of practices and techniques available during the development process. These measures are subjective and therefore relative and dynamic in the sense that an extreme new case could change the values of the sample. Since they are relative (subjective) measures, they are primarily explanatory. The samples, however, can be used to obtain typical, average, or trend values. They can be predictive when the skills and the performance of development team personnel are well known.

The remainder of this subsection contains tables and figures that describe the Practices and Techniques measures with brief phrases, raw numbers, simple statistics, and graphics. These tables and figures include

- Descriptions of the measures with code numbers, mnemonic names, acceptable values, and brief phrases (Table A.1.1-1)
- Values of the measures for 25 systems (Table A.1.1-2), where large values indicate a high degree of use
- Summary statistics for 11 projects (Table A.1.1-3)
- Cluster map for 11 projects (Figure A.1.1-1)
- Summary statistics for 20 independent systems (Table A.1.1-4)
- Cluster map for 20 independent systems (Figure A.1.1-2)
- Summary statistics for 9 large systems (Table A.1.1-5)
- Cluster map for 9 large systems (Figure A.1.1-3)
- Summary statistics for 11 small systems (Table A.1.1-6)
- Cluster map for 11 small systems (Figure A.1.1-4)

Table A.1.1-1. Practices and Techniques: Description of Measures (1 of 2)

Code	Measure	Range		Description
		Low	High	
Organization				
MT01	ORGCHIEF	00	50	Chief Programmer
MT02	ORG	00	00	Not Defined
Design				
MT03	DWALKTHR	00	50	Walkthroughs
MT04	DFORREV	00	50	Formal Reviews
MT05	DFORISMS	00	50	Formalisms
MT06	DTRECHAR	00	50	Tree Charts
MT07	DPDL	00	50	Program Design Language (PDL)
MT08	DHIPO	00	50	Hierarchical Input Processing Output (HIPO)
MT09	DTOPDOWN	00	50	Top-Down
MT10	DIENHANC	00	50	Iterative Enhancement
MT11	DN2CHART	00	50	N-Squared Charts
MT12	D	00	00	Not Defined
MT13	D	00	00	Not Defined
MT14	D	00	00	Not Defined
Code				
MT15	CSTUBS	00	50	Stubs
MT16	CTOPDOWN	00	50	Top-Down
MT17	CSTRUCT	00	50	Structured
MT18	CWALKLTHR	00	50	Walkthroughs
MT19	CREADING	00	50	Reading
MT20	CCONFIG	00	50	Configuration Control
MT21	C	00	00	Not Defined
MT22	C	00	00	Not Defined
MT23	C	00	00	Not Defined

Table A.1.1-1. Practices and Techniques: Description of Measures (2 of 2)

<u>Code</u>	<u>Measure</u>	<u>Range</u>		<u>Description</u>
		<u>Low</u>	<u>High</u>	
				Test
MT24	TFORISMS	00	50	Formalism
MT25	TFOLTHRU	00	50	Followthrough
MT26	TBATCH	00	50	Batch Processing
MT27	TVNVPRES	00	50	Verification and Validation (V&V) Team Presence
MT28	TVNVUSE	00	50	V&V Team Use
MT29	T	00	00	Not Defined
MT30	T	00	00	Not Defined
MT81	DESIGN	000	400	Sum MT03 Through MT10
MT82	CODE	000	300	Sum MT15 Through MT20
MT83	TEST	000	250	Sum MT24 Through MT28
MT84	TOTAL	0000	1000	Sum MT81 Through MT83 and MT01

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Table A.1.1-2. Practices and Techniques: Values of the Measures for 25 Systems (1 of 2)

PRCD	MT01	MT03	MT04	MT05	MT06	MT07	MT08	MT09	MT10
0100	45	40	40	50	40	0	0	20	40
0200	40	10	30	40	30	0	0	20	20
0300	25	10	25	30	30	0	0	20	20
0400	20	10	25	35	40	10	0	20	20
0500	50	45	50	50	40	20	0	10	40
0600	50	40	50	45	40	30	0	25	10
0700	35	35	40	45	40	20	0	20	30
0800	50	40	45	50	50	30	25	25	40
0900	20	40	50	40	30	20	0	20	20
1000	30	40	50	40	35	20	0	20	30
1100	40	35	45	40	30	10	0	20	40
9000	25	40	50	40	30	20	0	20	25
0610	50	40	50	45	40	30	0	20	40
0620	50	40	50	40	40	10	0	30	40
0630	40	45	40	45	35	20	0	30	40
0631	50	50	50	50	40	35	0	30	40
0632	20	35	20	30	30	0	0	30	40
0710	40	35	40	45	40	20	0	20	40
0720	50	40	40	45	40	25	0	20	40
0730	35	35	40	45	40	20	0	20	20
0740	40	40	35	45	40	10	0	10	15
0750	40	20	30	25	30	0	0	25	50
0760	50	40	35	45	40	0	0	10	10
0770	40	40	30	45	40	35	0	20	40
0780	40	35	30	40	40	20	0	20	40

PRCD	MT15	MT16	MT17	MT18	MT19	MT20	MT24	MT25	MT26	MT27	MT28
0100	50	40	30	30	40	45	50	45	50	0	0
0200	0	10	20	0	10	30	0	5	10	0	0
0300	0	10	10	10	20	20	20	15	30	0	0
0400	0	10	35	0	10	20	30	25	30	0	0
0500	45	30	45	30	50	50	50	45	40	0	0
0600	45	40	35	25	45	40	45	40	40	0	0
0700	30	35	30	5	30	20	45	30	15	0	0
0800	40	40	45	35	40	50	50	45	50	0	0
0900	20	10	20	5	10	0	30	0	10	40	10
1000	35	20	30	10	20	20	35	30	20	35	35
1100	25	30	30	0	5	20	40	25	5	25	10
9000	25	15	25	5	15	10	35	15	15	35	20
0610	45	40	35	30	50	40	50	45	40	0	0
0620	30	40	20	0	10	40	30	25	40	0	0
0630	35	40	45	30	50	45	40	30	45	0	0
0631	45	45	45	40	50	50	40	30	45	0	0
0632	10	40	45	10	40	30	20	10	45	0	0
0710	30	40	40	0	10	30	45	35	30	0	0
0720	40	40	45	0	40	45	45	40	30	0	0
0730	40	30	25	10	35	30	40	25	10	0	0
0740	10	20	30	10	30	40	40	30	0	0	0
0750	0	40	35	0	10	0	30	20	45	0	0
0760	0	20	35	0	40	45	45	40	0	0	0
0770	45	30	35	0	10	40	40	35	50	0	0
0780	40	40	35	10	40	45	45	40	0	0	0

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Table A.1.1-2. Practices and Techniques: Values of the
Measures for 25 Systems (2 of 2)

PRCO	MT81	MT82	MT83	MT84
0100	230	235	145	655
0200	150	70	15	275
0300	135	70	65	295
0400	160	75	85	340
0500	255	250	135	690
0600	270	230	125	675
0700	230	150	90	505
0800	305	250	145	750
0900	220	65	90	395
1000	235	135	155	555
1100	220	110	105	475
9000	225	95	120	465
0610	265	240	135	690
0620	250	140	95	535
0630	255	245	115	655
0631	295	275	115	735
0632	185	175	75	455
0710	240	150	110	540
0720	250	210	115	625
0730	220	170	75	500
0740	195	140	70	445
0750	180	85	95	400
0760	180	140	85	455
0770	250	160	125	575
0780	225	210	85	560

Table A.1.1-3. Practices and Techniques: Summary Statistics for 11 Projects

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
MT01	ORGCHIEF	0	50	20	25	40	50	50	36.8	11.7	25.1	48.5
MT03	DWALKTHR	0	50	10	10	40	40	45	31.4	14.0	17.4	45.3
MT04	DFORREV	0	50	25	30	45	50	50	40.9	10.0	31.0	50.9
MT05	DFORISMS	0	50	30	40	40	50	50	42.3	6.5	35.8	48.7
MT06	DTRECHAR	0	50	30	30	40	40	50	36.8	6.4	30.4	43.2
MT07	DPDL	0	50	0	0	20	20	30	14.5	11.3	3.3	25.8
MT08	DHIPO	0	50	0	0	0	0	25	2.3	7.5	-5.3	9.8
MT09	DTOPDOWN	0	50	10	20	20	20	25	20.0	3.9	16.1	23.9
MT10	DIENHANC	0	50	20	20	30	40	40	30.9	9.4	21.5	40.3
MT15	CSTUBS	0	50	0	0	30	45	50	26.4	19.1	7.2	45.5
MT16	CTOPDOWN	0	50	10	10	30	40	40	25.0	13.2	11.8	38.2
MT17	CSTRUCT	0	50	10	20	30	35	45	30.0	10.5	19.5	40.5
MT18	CWALKTHR	0	50	0	0	10	30	35	13.6	13.6	0.0	27.3
MT19	CREADING	0	50	5	10	20	40	50	25.5	16.2	9.3	41.6
MT20	CCONFIG	0	50	0	20	20	45	50	28.6	15.8	12.8	44.5
MT24	TFORISMS	0	50	0	30	40	50	50	35.9	15.5	20.4	51.4
MT25	TFOLTHRU	0	50	0	15	30	45	45	27.7	15.9	11.9	43.6
MT26	TBATCH	0	50	5	10	30	40	50	27.3	16.3	10.9	43.6
MT27	TVNVPRES	0	50	0	0	0	25	40	9.1	15.9	-6.8	25.0
MT28	TVNVUSE	0	50	0	0	0	10	35	5.0	10.7	-5.7	15.7
MT81	DESIGN	0	400	135	160	230	255	305	219.1	52.0	167.0	271.1
MT82	CODE	0	300	65	70	135	235	250	149.1	78.2	70.9	227.3
MT83	TEST	0	250	15	85	105	145	155	105.0	41.9	63.1	146.9
MT84	TOTAL	0	1000	275	340	505	675	750	510.0	168.8	341.2	678.8

NUMBER OF CLUSTERS	PRCO											
	0	0	0	0	0	1	1	0	0	0	0	0
	1	5	6	8	7	1	0	2	3	4	9	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
11	*	*	*	*	*	*	*	*	*	*	*	*
10	*	*****	*	*	*	*	*	*	*	*	*	*
9	*****	*	*	*	*	*	*	*	*	*	*	*
8	*****	*	*	*	*	*	*	*	*	*	*	*
7	*****	*	*****	*	*	*	*	*	*	*	*	*
6	*****	*	*****	*	*	*	*	*	*	*	*	*
5	*****	*	*****	*	*	*	*	*	*	*	*	*
4	*****	*	*****	*	*	*	*	*	*	*	*	*
3	*****	*	*****	*	*	*	*	*	*	*	*	*
2	*****	*	*****	*	*	*	*	*	*	*	*	*
1	*****	*	*****	*	*	*	*	*	*	*	*	*

Figure A.1.1-1. Practices and Techniques: Cluster Map for 11 Projects

Table A.1.1-4. Practices and Techniques: Summary Statistics for 20 Independent Systems

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
MT01	ORGCHIEF	0	50	20	36	40	50	50	39.8	9.7	30.1	49.4
MT03	DWALKTHR	0	50	10	35	40	40	45	34.0	11.5	22.5	45.5
MT04	DFORREV	0	50	25	30	40	49	50	39.0	8.7	30.3	47.7
MT05	DFORISMS	0	50	25	40	45	45	50	42.0	6.4	35.6	48.4
MT06	DTRECHAR	0	50	30	31	40	40	50	37.5	5.3	32.2	42.8
MT07	DPDL	0	50	0	3	20	20	35	15.0	11.1	3.9	26.1
MT08	DHIPO	0	50	0	0	0	0	25	1.3	5.6	-4.3	6.8
MT09	DTOPDOWN	0	50	10	20	20	20	30	20.0	5.4	14.6	25.4
MT10	DIENHANC	0	50	10	20	40	40	50	32.3	11.5	20.7	43.8
MT15	CSTUBS	0	50	0	3	33	40	50	26.5	18.2	8.3	44.7
MT16	CTOPDOWN	0	50	10	20	30	40	40	29.0	12.1	16.9	41.1
MT17	CSTRUCT	0	50	10	26	35	39	45	32.3	9.7	22.6	41.9
MT18	CWALKTHR	0	50	0	0	8	25	35	10.5	12.9	-2.4	23.4
MT19	CREADING	0	50	5	10	25	40	50	26.5	16.4	10.1	42.9
MT20	CCONFIG	0	50	0	20	40	45	50	32.8	15.2	17.6	47.9
MT24	TFORISMS	0	50	0	30	40	45	50	37.8	12.2	25.6	49.9
MT25	TFOLTHRU	0	50	0	25	30	40	45	30.0	13.0	17.0	43.0
MT26	TBATCH	0	50	0	10	30	44	50	26.8	18.3	8.4	45.1
MT27	TVNVPRES	0	50	0	0	0	0	40	5.0	12.5	-7.5	17.5
MT28	TVNVUSE	0	50	0	0	0	0	35	2.8	8.2	-5.4	10.9
MT81	DESIGN	0	400	135	184	228	250	305	221.0	42.7	178.3	263.7
MT82	CODE	0	300	65	91	145	229	250	157.5	66.1	91.4	223.6
MT83	TEST	0	250	15	85	100	133	155	102.3	33.6	68.7	135.8
MT84	TOTAL	0	1000	275	411	538	648	750	520.5	135.7	384.8	656.2

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	PRCO																			
NUMBER OF CLUSTERS:	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0
	1	5	6	6	7	8	2	3	4	6	7	7	0	7	7	7	7	1	7	9
	0	0	1	3	2	0	0	0	0	2	1	7	0	3	8	4	6	0	5	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
19	*	*****	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
18	*	*****	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
17	*	*****	*	*	*	*	*	*	*	*****	*	*	*	*	*	*	*	*	*	*
16	*	*****	*	*	*	*	*	*	*	*****	*	*	*	*	*	*	*	*	*	*
15	*****	*	*	*	*	*	*	*	*	*****	*	*	*	*	*	*	*	*	*	*
14	*****	*	*	*	*	*	*	*	*	*****	*	*	*	*	*	*	*	*	*	*
13	*****	*	*	*	*	*	*	*	*	*****	*	*	*	*	*	*	*	*	*	*
12	*****	*	*	*	*	*	*	*	*	*****	*	*	*	*	*	*	*	*	*	*
11	*****	*	*	*	*	*	*	*	*	*****	*	*	*	*	*	*	*	*	*	*
10	*****	*	*	*	*	*	*	*	*	*****	*	*	*	*	*	*	*	*	*	*
9	*****	*	*	*	*	*	*	*	*	*****	*	*	*	*	*	*	*	*	*	*
8	*****	*	*	*	*	*	*	*	*	*****	*	*	*	*	*	*	*	*	*	*
7	*****	*	*	*	*	*	*	*	*	*****	*	*	*	*	*	*	*	*	*	*
6	*****	*	*	*	*	*	*	*	*	*****	*	*	*	*	*	*	*	*	*	*
5	*****	*	*	*	*	*	*	*	*	*****	*	*	*	*	*	*	*	*	*	*
4	*****	*	*	*	*	*	*	*	*	*****	*	*	*	*	*	*	*	*	*	*
3	*****	*	*	*	*	*	*	*	*	*****	*	*	*	*	*	*	*	*	*	*
2	*****	*	*	*	*	*	*	*	*	*****	*	*	*	*	*	*	*	*	*	*
1	*****	*	*	*	*	*	*	*	*	*****	*	*	*	*	*	*	*	*	*	*

Figure A.1.1-2. Practices and Techniques: Cluster Map for 20 Independent Systems

Table A.1.1-5. Practices and Techniques: Summary Statistics
for 9 Large Systems

CODE	NAME	--ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
MT01	ORGCHIEF	0	50	20	23	35	48	50	35.0	12.0	23.0	47.0
MT03	DWALKTHR	0	50	10	10	40	40	45	30.0	15.2	14.8	45.2
MT04	DFORREV	0	50	25	28	40	50	50	40.0	10.9	29.1	50.9
MT05	DFORISMS	0	50	30	38	40	48	50	41.7	6.6	35.1	48.3
MT06	DIRECHAR	0	50	30	30	40	40	40	36.1	4.9	31.3	41.0
MT07	DPDL	0	50	0	0	20	20	30	13.3	11.2	2.2	24.5
MT08	DHIPO	0	50	0	0	0	0	0	0.0	0.0	0.0	0.0
MT09	DTOPDOWN	0	50	10	20	20	20	20	18.9	3.3	15.6	22.2
MT10	DIENHANC	0	50	20	20	20	40	40	27.8	9.7	18.1	37.5
MT15	CSTUBS	0	50	0	0	35	45	50	26.1	21.3	4.8	47.4
MT16	CTOPDOWN	0	50	10	10	20	35	40	22.2	13.0	9.2	35.2
MT17	CSTRUCT	0	50	10	20	30	35	45	27.8	10.3	17.4	38.1
MT18	CWALKTHR	0	50	0	3	10	30	30	13.9	12.7	1.2	26.6
MT19	CREADING	0	50	10	10	20	45	50	27.2	16.8	10.4	44.0
MT20	CCONFIG	0	50	0	20	30	43	50	28.3	15.4	12.9	43.7
MT24	TFORISMS	0	50	0	25	35	50	50	33.9	16.5	17.3	50.4
MT25	TFOLTHRU	0	50	0	10	25	45	45	26.1	17.1	9.0	43.2
MT26	TBATCH	0	50	10	10	30	40	50	26.7	15.0	11.7	41.7
MT27	TVNVPRES	0	50	0	0	0	18	40	8.3	16.6	-8.2	24.9
MT28	TVNVUSE	0	50	0	0	0	5	35	5.0	11.7	-6.7	16.7
MT81	DESIGN	0	400	135	155	220	245	265	207.8	47.4	160.4	255.2
MT82	CODE	0	300	65	70	135	238	250	145.6	80.2	65.4	225.7
MT83	TEST	0	250	15	70	90	140	155	100.0	46.0	54.0	146.0
MT84	TOTAL	0	1000	275	318	500	673	690	488.3	168.6	319.8	656.9

	PRCO									
NUMBER OF CLUSTERS	0	0	0	0	1	0	0	0	0	0
	1	5	6	7	0	2	3	4	9	
	0	0	1	3	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0
9	*	*	*	*	*	*	*	*	*	*
8	*	*****	*	*	*	*	*	*	*	*
7	*****	*	*	*	*	*	*	*	*	*
6	*****	*	*	*	*	*	*	*	*	*
5	*****	*	*	*	*	*	*	*	*	*
4	*****	*****	*****	*****	*****	*****	*****	*****	*****	*
3	*****	*****	*****	*****	*****	*****	*****	*****	*****	*
2	*****	*****	*****	*****	*****	*****	*****	*****	*****	*
1	*****	*****	*****	*****	*****	*****	*****	*****	*****	*

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Figure A.1.1-3. Practices and Techniques: Cluster Map for 9 Large Systems

Table A.1.1-6. Practices and Techniques: Summary Statistics for
11 Small Systems

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
MT01	ORGCHIEF	0	50	40	40	40	50	50	43.6	5.0	38.6	48.7
MT03	DWALKTHR	0	50	20	35	40	40	45	37.3	6.5	30.8	43.7
MT04	DFORREV	0	50	30	30	40	45	50	38.2	6.8	31.4	45.0
MT05	DFORISMS	0	50	25	40	45	45	50	42.3	6.5	35.8	48.7
MT06	DTRECHAR	0	50	30	35	40	40	50	38.6	5.5	33.1	44.2
MT07	DPDL	0	50	0	10	20	25	35	16.4	11.4	4.9	27.8
MT08	DHIPD	0	50	0	0	0	0	25	2.3	7.5	-5.3	9.8
MT09	DTOPDOWN	0	50	10	20	20	25	30	20.9	6.6	14.3	27.5
MT10	DIENHANC	0	50	10	40	40	40	50	35.9	12.0	23.9	47.9
MT15	CSTUBS	0	50	0	10	30	40	45	26.8	16.3	10.5	43.1
MT16	CTOPDOWN	0	50	20	30	40	40	40	34.5	8.2	26.3	42.7
MT17	CSTRUCT	0	50	20	30	35	45	45	35.9	7.7	28.2	43.6
MT18	CWALKTHR	0	50	0	0	0	10	35	7.7	12.9	-5.2	20.6
MT19	CREADING	0	50	5	10	30	40	50	25.9	16.9	9.1	42.8
MT20	CCONFIG	0	50	0	30	40	45	50	36.4	14.7	21.7	51.0
MT24	TFORISMS	0	50	30	40	40	45	50	40.9	6.3	34.7	47.2
MT25	TFOLTHRU	0	50	20	25	35	40	45	33.2	7.8	25.3	41.0
MT26	TBATCH	0	50	0	0	30	45	50	26.8	21.4	5.5	48.2
MT27	TVNVPRES	0	50	0	0	0	0	25	2.3	7.5	-5.3	9.8
MT28	TVNVUSE	0	50	0	0	0	0	10	0.9	3.0	-2.1	3.9
MT81	DESIGN	0	400	180	195	240	250	305	231.8	37.2	194.6	269.1
MT82	CODE	0	300	85	140	150	210	250	167.3	54.0	113.3	221.3
MT83	TEST	0	250	70	85	105	115	145	104.1	21.1	83.0	125.2
MT84	TOTAL	0	1000	400	455	540	625	750	546.8	102.8	444.0	649.7

	PRCO											
NUMBER OF	0	0	0	0	0	0	1	0	0	0	0	0
CLUSTERS	6	7	7	7	7	7	1	7	6	7	8	
	2	1	7	8	4	6	0	5	3	2	0	
	0	0	0	0	0	0	0	0	0	0	0	
11	*	*	*	*	*	*	*	*	*	*	*	
10	*	*	*	*	*	*	*	*	*	*	*	
9	*	*	*	*	*	*	*	*	*	*	*	
8	*	*	*	*	*	*	*	*	*	*	*	
7	*	*	*	*	*	*	*	*	*	*	*	
6	*	*	*	*	*	*	*	*	*	*	*	
5	*	*	*	*	*	*	*	*	*	*	*	
4	*	*	*	*	*	*	*	*	*	*	*	
3	*	*	*	*	*	*	*	*	*	*	*	
2	*	*	*	*	*	*	*	*	*	*	*	
1	*	*	*	*	*	*	*	*	*	*	*	

Figure A.1.1-4. Practices and Techniques: Cluster Map
for 11 Small Systems

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A.1.2 TOOLS

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--	Objective	--	X	--	Subjective
--	Absolute	--	X	--	Relative
--	Explicit	--	X	--	Derived
--	Static	--	X	--	Dynamic
--	Predictive	--	X	--	Explanatory

This category measures the degree of use of tools available during the development process. These measures are subjective and therefore relative and dynamic in the sense that an extreme new case could change the values of the sample. Since they are relative (subjective) measures, they are primarily explanatory. The samples, however, can be used to obtain typical, average, or trend values. They can be predictive when the skills and the performance of development team personnel are well known.

The remainder of this subsection contains tables and figures that describe the Tools measures with brief phrases, raw numbers, simple statistics, and graphics. These tables and figures include

- Descriptions of the measures with code numbers, mnemonic names, acceptable values, and brief phrases (Table A.1.2-1)
- Values of the measures for 25 systems (Table A.1.2-2), where large values indicate a high degree of use
- Summary statistics for 11 projects (Table A.1.2-3)
- Cluster map for 11 projects (Figure A.1.2-1)
- Summary statistics for 20 independent systems (Table A.1.2-4)
- Cluster map for 20 independent systems (Figure A.1.2-2)

- Summary statistics for 9 large systems
(Table A.1.2-5)
- Cluster map for 9 large systems (Figure A.1.2-3)
- Summary statistics for 11 small systems
(Table A.1.2-6)
- Cluster map for 11 small systems (Figure A.1.2-4)

Table A.1.2-1. Tools: Description of Measures

Code	Measure	Range		Description
		Low	High	
TS01	FRMTRAIN	00	50	Formal Training in Methodology
TS02	INFTRAIN	00	50	Informal Training
TS03	MTRENFRC	00	50	Methodology Reenforcement
TS04	MEDLR	00	50	Requirements Language (MEDL-R)
TS05	PDL	00	50	Design Language (PDL)
TS06	SFORT	00	50	Precompiler (SFORT)
TS07	AIDS	00	50	Software Aids (e.g., XREF, MAP, LIST)
TS08	LIBRARIN	00	50	Librarian
TS09	DATAGENS	00	50	Data Generators
TS10	TSO	00	50	Terminals (TSO)
TS11	RJP	00	50	Remote Job Processing (RJP)
TS12	CAT	00	50	Configuration Analysis Tool (CAT)
TS13		00	00	Not Defined
TS14		00	00	Not Defined
TS15		00	00	Not Defined
TS81	TOTAL	000	600	Sum TS01 Through TS12

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Table A.1.2-2. Tools: Values of the Measures for
25 Systems

PRCD	TS01	TS02	TS03	TS04	TS05	TS06	TS07	TS08	TS09	TS10
0100	20	30	50	0	0	0	40	50	50	50
0200	0	0	0	0	0	0	30	10	0	40
0300	0	0	20	0	0	30	20	0	0	30
0400	10	0	10	0	20	40	30	0	0	10
0500	50	30	50	0	40	40	50	50	20	50
0600	50	30	50	0	50	50	50	50	40	40
0700	20	20	30	0	30	50	30	10	5	20
0800	50	20	50	0	50	50	40	40	10	50
0900	10	40	10	10	30	40	25	10	30	20
1000	20	40	25	15	30	40	30	25	0	0
1100	0	40	15	10	30	50	15	10	0	0
9000	15	40	15	15	30	40	25	15	15	10
0610	50	30	50	0	50	50	50	50	40	40
0620	50	10	30	0	30	50	10	50	0	40
0630	30	20	40	0	35	35	25	40	35	25
0631	50	30	50	0	50	50	40	50	50	30
0632	0	0	20	0	0	0	0	10	0	0
0710	0	0	30	0	40	50	30	10	0	0
0720	50	20	50	0	40	50	40	10	20	50
0730	30	20	30	0	30	40	30	25	0	10
0740	0	20	30	0	20	50	0	15	0	0
0750	0	10	0	0	0	50	0	0	0	0
0760	30	20	20	0	0	30	40	10	0	50
0770	30	20	40	0	50	50	40	10	0	30
0780	30	20	30	0	40	50	30	20	0	50

PRCD	TS11	TS12	TS81
0100	50	0	340
0200	10	0	90
0300	30	0	130
0400	20	0	140
0500	40	0	420
0600	50	0	460
0700	15	0	230
0800	50	0	410
0900	15	20	260
1000	30	5	260
1100	5	5	180
9000	20	10	250
0610	50	0	460
0620	50	0	320
0630	50	0	335
0631	50	0	450
0632	50	0	80
0710	20	0	180
0720	30	0	360
0730	20	0	235
0740	0	0	135
0750	0	0	60
0760	0	0	200
0770	50	0	320
0780	0	0	270

Table A.1.2-3. Tools: Summary Statistics for 11 Projects

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
TS01	FRMTRAIN	0	50	0	0	20	50	50	20.9	20.2	0.7	41.1
TS02	INFTRAIN	0	50	0	0	30	40	40	22.7	16.2	6.5	38.9
TS03	MTRENFRC	0	50	0	10	25	50	50	28.2	19.0	9.2	47.2
TS04	MEDLR	0	50	0	0	0	10	15	3.2	5.6	-2.4	8.8
TS05	PDL	0	50	0	0	30	40	50	25.5	18.6	6.8	44.1
TS06	SFORT	0	50	0	30	40	50	50	35.5	18.6	16.8	54.1
TS07	AIDS	0	50	15	25	30	40	50	32.7	11.3	21.5	44.0
TS08	LIBRARIN	0	50	0	10	10	50	50	23.2	20.5	2.7	43.7
TS09	DATAGENS	0	50	0	0	5	30	50	14.1	18.3	-4.2	32.4
TS10	TSO	0	50	0	10	30	50	50	28.2	19.4	8.8	47.6
TS11	RJP	0	50	5	15	30	50	50	28.6	16.9	11.7	45.5
TS12	CAT	0	50	0	0	0	5	20	2.7	6.1	-3.3	8.8
TS81	TOTAL	0	600	90	140	260	410	460	265.5	127.2	138.3	392.6

	PRCO										
NUMBER OF	0	0	0	0	0	0	0	0	0	1	1
CLUSTERS	1	5	8	6	2	3	4	7	9	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
11	*	*	*	*	*	*	*	*	*	*	*
10	*	*****	*	*	*	*	*	*	*	*	*
9	*	*****	*	*	*	*****	*	*	*	*	*
8	*	*****	*	*	*	*****	*	*****	*	*	*
7	*	*****	*	*	*	*****	*****	*****	*	*	*
6	*	*****	*	*	*	*****	*****	*****	*	*	*
5	*	*****	*	*	*	*****	*****	*****	*	*	*
4	*	*****	*	*	*	*****	*****	*****	*	*	*
3	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
2	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****

Figure A.1.2-1. Tools: Cluster Map for 11 Projects

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Table A.1.2-4. Tools: Summary Statistics for 20 Independent Systems

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
TS01	FRMTRAIN	0	50	0	0	25	45	50	23.0	19.8	3.2	42.8
TS02	INFTRAIN	0	50	0	10	20	30	40	19.5	13.2	6.3	32.7
TS03	MTRENFRC	0	50	0	16	30	48	50	29.0	16.6	12.4	45.6
TS04	MEDLR	0	50	0	0	0	0	15	1.8	4.4	-2.6	6.1
TS05	PDL	0	50	0	5	30	40	50	26.8	17.9	8.8	44.7
TS06	SFORT	0	50	0	36	45	50	50	39.8	15.3	24.5	55.0
TS07	AIDS	0	50	0	21	30	40	50	28.8	14.2	14.5	43.0
TS08	LIBRARIN	0	50	0	10	13	40	50	21.8	18.2	3.5	40.0
TS09	DATAGENS	0	50	0	0	0	20	50	10.3	16.3	-6.0	26.5
TS10	TSO	0	50	0	3	30	50	50	27.3	20.5	6.8	47.7
TS11	RJP	0	50	0	6	25	50	50	26.0	19.6	6.4	45.6
TS12	CAT	0	50	0	0	0	0	20	1.5	4.6	-3.1	6.1
TSB1	TOTAL	0	600	60	150	260	339	460	255.3	114.7	140.6	369.9

	PRCO																			
NUMBER OF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0
CLUSTERS	1	6	6	7	7	5	8	6	2	7	3	4	7	7	1	7	7	0	9	7
	0	2	3	2	7	0	0	1	0	5	0	0	4	1	0	6	3	0	0	8
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
19	*	*	*	*	*	*****	*	*	*	*	*	*	*	*	*	*	*	*	*	*
18	*	*	*	*	*	*****	*	*	*	*	*****	*	*	*	*	*	*	*	*	*
17	*	*	*	*	*	*****	*	*	*	*	*****	*	*	*	*	*	*****	*	*	*
16	*	*	*	*	*	*****	*	*	*	*	*****	*	*	*	*	*	*****	*	*	*
15	*	*****	*	*	*	*****	*	*	*	*	*****	*	*	*	*	*	*****	*	*	*
14	*	*****	*****	*****	*****	*****	*	*	*	*	*****	*	*	*	*	*	*****	*	*	*
13	*	*****	*****	*****	*****	*****	*	*	*	*	*****	*	*	*	*	*	*****	*****	*****	*
12	*	*****	*****	*****	*****	*****	*	*	*	*	*****	*****	*	*	*	*	*****	*****	*****	*
11	*	*****	*****	*****	*****	*****	*****	*	*	*	*****	*****	*	*	*	*	*****	*****	*****	*
10	*	*****	*****	*****	*****	*****	*****	*	*	*	*****	*****	*	*	*	*	*****	*****	*****	*
9	*	*****	*****	*****	*****	*****	*****	*	*	*	*****	*****	*	*	*	*	*****	*****	*****	*
8	*	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*
7	*	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*
6	*	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*
5	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*
4	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*
3	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*
2	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*
1	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*

Figure A.1.2-2. Tools: Cluster Map for 20 Independent Systems

Table A.1.2-5. Tools: Summary Statistics for 9 Large Systems

CODE	NAME	ALLOWED-RANGE		ACTUAL-RANGE					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
TS01	FRMTRAIN	0	50	0	5	20	40	50	21.1	19.0	2.1	40.1
TS02	INFTRAIN	0	50	0	0	30	35	40	21.1	16.9	4.2	38.0
TS03	MTRENFRC	0	50	0	10	25	50	50	27.2	19.2	8.0	46.4
TS04	MEDLR	0	50	0	0	0	5	15	2.8	5.7	-2.9	8.4
TS05	PDL	0	50	0	0	30	35	50	22.2	18.6	3.7	40.8
TS06	SFORT	0	50	0	15	40	40	50	31.1	18.3	12.8	49.4
TS07	AIDS	0	50	20	28	30	45	50	33.9	10.5	23.3	44.4
TS08	LIBRARIN	0	50	0	5	25	50	50	24.4	21.1	3.3	45.6
TS09	DATAGENS	0	50	0	0	0	35	50	15.6	20.1	-4.5	35.6
TS10	TSO	0	50	0	10	30	45	50	27.8	18.6	9.2	46.3
TS11	RJP	0	50	10	18	30	45	50	29.4	14.7	14.8	44.1
TS12	CAT	0	50	0	0	0	3	20	2.8	6.7	-3.9	9.4
TS81	TOTAL	0	600	90	135	260	380	460	259.4	128.9	130.6	388.3

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NUMBER OF CLUSTERS	PRCO									
	0	0	1	0	0	0	0	0	0	0
	1	7	0	9	5	6	2	3	4	
	0	3	0	0	0	1	0	0	0	
	0	0	0	0	0	0	0	0	0	
9	*	*	*	*	*	*	*	*	*	*
8	*	*	*	*	*	*	*	*	*	*
7	*	*	*	*	*	*	*	*	*	*
6	*	*	*	*	*	*	*	*	*	*
5	*	*	*	*	*	*	*	*	*	*
4	*	*	*	*	*	*	*	*	*	*
3	*	*	*	*	*	*	*	*	*	*
2	*	*	*	*	*	*	*	*	*	*
1	*	*	*	*	*	*	*	*	*	*

Figure A.1.2-3. Tools: Cluster Map for 9 Large Systems

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Table A.1.2-6. Tools: Summary Statistics for 11 Small Systems

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
TS01	FRMTRAIN	0	50	0	0	30	50	50	24.5	21.1	3.4	45.7
TS02	INFTRAIN	0	50	0	10	20	20	40	18.2	9.8	8.4	28.0
TS03	MTRENFRC	0	50	0	20	30	40	50	30.5	14.9	15.5	45.4
TS04	MEDLR	0	50	0	0	0	0	10	0.9	3.0	-2.1	3.9
TS05	PDL	0	50	0	20	35	40	50	30.5	17.4	13.1	47.8
TS06	SFORT	0	50	30	50	50	50	50	46.8	7.2	39.7	54.0
TS07	AIDS	0	50	0	10	30	40	40	24.5	15.9	8.7	40.4
TS08	LIBRARIN	0	50	0	10	10	40	50	19.5	16.2	3.4	35.7
TS09	DATAGENS	0	50	0	0	0	10	35	5.9	11.6	-5.7	17.5
TS10	TSO	0	50	0	0	30	50	50	26.8	22.8	4.0	49.7
TS11	RJP	0	50	0	0	20	50	50	23.2	23.3	-0.1	46.4
TS12	CAT	0	50	0	0	0	0	5	0.5	1.5	-1.1	2.0
TSB1	TOTAL	0	600	60	180	270	335	410	251.8	108.0	143.8	359.9

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NUMBER OF CLUSTERS	PRCO											
	0	0	0	0	0	0	1	0	0	0	0	0
	6	6	7	7	8	7	1	7	7	7	7	7
	2	3	2	7	0	1	0	4	5	6	8	8
	0	0	0	0	0	0	0	0	0	0	0	0
11	*	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*	*	*	*	*	*	*	*	*
9	*	*	*	*	*	*	*	*	*	*	*	*
8	*	*	*	*	*	*	*	*	*	*	*	*
7	*	*	*	*	*	*	*	*	*	*	*	*
6	*	*	*	*	*	*	*	*	*	*	*	*
5	*	*	*	*	*	*	*	*	*	*	*	*
4	*	*	*	*	*	*	*	*	*	*	*	*
3	*	*	*	*	*	*	*	*	*	*	*	*
2	*	*	*	*	*	*	*	*	*	*	*	*
1	*	*	*	*	*	*	*	*	*	*	*	*

Figure A.1.2-4. Tools: Cluster Map for 11 Small Systems

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— — —	Objective	— <u>X</u> —	Subjective
— — —	Absolute	— <u>X</u> —	Relative
— — —	Explicit	— <u>X</u> —	Derived
— — —	Static	— <u>X</u> —	Dynamic
— — —	Predictive	— <u>X</u> —	Explanatory

This category measures the degree of use of documentation procedures available during the development process. These measures are subjective and therefore relative and dynamic in the sense that an extreme new case could change the values of the sample. Since they are relative (subjective) measures, they are primarily explanatory. The samples, however, can be used to obtain typical, average, or trend values. They can be predictive when the skills and the performance of development personnel are well known.

The remainder of this subsection contains tables and figures that describe the documentation measures with brief phrases, raw numbers, simple statistics, and graphics. These tables and figures include

- Descriptions of the measures with code numbers, mnemonic names, acceptable values, and brief phrases (Table A.1.3-1)
- Values of the measures for 25 systems (Table A.1.3-2), where large values indicate a high degree of use
- Summary statistics for 11 projects (Table A.1.3-3)
- Cluster map for 11 projects (Figure A.1.3-1)
- Summary statistics for 20 independent systems (Table A.1.3-4)
- Cluster map for 20 independent systems (Figure A.1.3-2)

- Summary statistics for 9 large systems
(Table A.1.3-5)
- Cluster map for 9 large systems (Figure A.1.3-3)
- Summary statistics for 11 small systems
(Table A.1.3-6)
- Cluster map for 11 small systems (Figure A.1.3-4)

Table A.1.3-1. Documentation: Description of Measures

Code	Measure	Range		Description
		Low	High	
DC01	SELFORMS	00	50	SEL Forms
DC02	DSGNDDOC	00	50	Design Document
DC03	DSGNDCSN	00	50	Design Decisions
DC04	SEMIQA	00	50	Semiformal Quality Assurance
DC05	ACTNOTBK	00	50	Activity Notebooks
DC06	UNITDEVF	00	50	Unit Development Folders
DC07	TESTPLAN	00	50	Test Plans
DC08	USERSSYS	00	50	User's Guide/System Description
DC09	FTUSERS	00	50	Formal Treatment of User's Guide/System Description
DC10	WEEKMNTH	00	50	Weekly/Monthly Progress Reports
DC11		00	00	Not Defined
DC12		00	00	Not Defined
DC13		00	00	Not Defined
DC14		00	00	Not Defined
DC15		00	00	Not Defined
DC81	TOTAL	000	500	Sum DC01 Through DC10

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Table A.1.3-2. Documentation: Values of the Measures for
25 Systems

PRC0	DC01	DC02	DC03	DC04	DC05	DC06	DC07	DC08	DC09	DC10	DC81
0100	50	40	30	10	40	0	40	40	50	45	345
0200	10	20	10	10	10	0	10	30	40	40	180
0300	10	20	0	10	30	10	10	20	30	30	170
0400	0	20	0	10	10	10	30	10	40	30	160
0500	50	40	50	10	50	10	40	40	50	50	390
0600	50	50	50	40	50	0	45	50	50	50	435
0700	30	40	20	25	40	0	35	40	50	40	320
0800	40	50	20	50	40	0	50	50	50	40	390
0900	25	40	10	35	40	0	40	35	40	25	290
1000	50	40	20	40	50	0	40	50	50	40	380
1100	20	40	10	35	50	0	40	30	20	30	275
9000	35	40	15	35	45	0	40	40	40	30	320
0610	50	50	50	50	50	0	50	50	50	50	450
0620	20	50	50	40	50	0	10	50	50	50	370
0630	20	40	40	40	40	0	10	50	50	40	330
0631	30	50	50	40	50	0	10	50	50	50	380
0632	10	25	25	15	25	0	10	10	40	10	170
0710	40	40	20	25	40	0	35	40	50	40	330
0720	40	50	20	25	40	0	45	40	50	40	350
0730	40	50	30	25	40	0	35	40	50	40	350
0740	40	40	30	25	40	0	35	40	50	40	340
0750	10	10	0	5	10	0	10	40	50	40	175
0760	10	30	0	25	40	0	35	40	50	40	270
0770	10	30	30	25	40	0	35	40	50	40	300
0780	10	10	0	25	40	0	25	40	50	40	240

Table A.1.3-3. Documentation: Summary Statistics for 11 Projects

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
DC01	SELFORMS	0	50	0	10	30	50	50	30.5	18.8	11.7	49.2
DC02	DSGND0C	0	50	20	20	40	40	50	36.4	11.2	25.2	47.6
DC03	DSGNDCSN	0	50	0	10	20	30	50	20.0	17.3	2.7	37.3
DC04	SEMIQA	0	50	10	10	25	40	50	25.0	15.5	9.5	40.5
DC05	ACTNOTBK	0	50	10	30	40	50	50	37.3	14.9	22.4	52.2
DC06	UNITDEVF	0	50	0	0	0	10	10	2.7	4.7	-1.9	7.4
DC07	TESTPLAN	0	50	10	30	40	40	50	34.5	13.1	21.4	47.7
DC08	USERSSYS	0	50	10	30	40	50	50	35.9	12.8	23.1	48.7
DC09	FTUSERS	0	50	20	40	50	50	50	42.7	10.1	32.6	52.8
DC10	WEEKMNTH	0	50	25	30	40	45	50	38.2	8.4	29.7	46.6
DCB1	TOTAL	0	500	160	180	320	390	435	303.2	97.3	205.8	400.5

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	PRCO										
NUMBER OF	0	0	0	1	0	0	1	0	0	0	0
CLUSTERS	1	7	9	1	5	8	0	6	2	3	4
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
11	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*	*	*****	*	*	*	*	*
9	*	*	*****	*	*****	*	*	*	*	*	*
8	*	*	*****	*	*****	*	*****	*	*****	*	*
7	*****	*****	*	*****	*	*****	*	*****	*	*****	*
6	*****	*****	*	*****	*	*****	*	*****	*	*****	*
5	*****	*****	*****	*****	*	*****	*	*****	*	*****	*
4	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
3	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
2	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****

Figure A.1.3-1. Documentation: Cluster Map for 11 Projects

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Table A.1.3-4. Documentation: Summary Statistics for 20 Independent Systems

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
DC01	SELFOMS	0	50	0	10	23	40	50	27.3	17.1	10.1	44.4
DC02	DSGNDOC	0	50	10	23	40	48	50	35.5	13.2	22.3	48.7
DC03	DSGNDCSN	0	50	0	3	20	30	50	21.0	17.4	3.6	38.4
DC04	SEMIQA	0	50	5	10	25	39	50	26.0	13.8	12.2	39.8
DC05	ACTNOTBK	0	50	10	40	40	48	50	37.5	12.9	24.6	50.4
DC06	UNITDEVF	0	50	0	0	0	0	10	1.5	3.7	-2.2	5.2
DC07	TESTPLAN	0	50	10	14	35	40	50	31.3	13.8	17.4	45.1
DC08	USERSYS	0	50	10	36	40	48	50	38.8	10.2	28.5	49.0
DC09	FTUSERS	0	50	20	43	50	50	50	46.0	8.2	37.8	54.2
DC10	WEEKMNTH	0	50	25	40	40	40	50	39.5	6.7	32.8	46.2
DCB1	TOTAL	0	500	160	248	330	365	450	304.3	83.3	221.0	387.5

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	PRCD																			
NUMBER OF CLUSTERS	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
	1	7	7	7	7	6	6	5	8	0	6	2	7	3	4	7	7	7	9	1
	0	2	3	1	4	2	3	0	0	0	1	0	5	0	0	6	8	7	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
19	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
18	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
17	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
16	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
15	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
14	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
13	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
12	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
11	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
9	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
8	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
7	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
6	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
5	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
4	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
3	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
1	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

Figure A.1.3-2. Documentation: Cluster Map for 20 Independent Systems

Table A.1.3-5. Documentation: Summary Statistics for
9 Large Systems

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
DC01	SELFOMS	0	50	0	10	40	50	50	31.7	20.6	11.1	52.3
DC02	DSGIDOC	0	50	20	20	40	45	50	35.6	12.4	23.2	47.9
DC03	DSGNDCSI	0	50	0	5	20	40	50	22.2	19.2	3.0	41.4
DC04	SEMIQA	0	50	10	10	10	38	50	22.2	15.8	6.4	38.1
DC05	ACTNOTBK	0	50	10	20	40	50	50	35.6	15.9	19.7	51.5
DC06	UNITDEVF	0	50	0	0	0	10	10	3.3	5.0	-1.7	8.3
DC07	TESTPLAN	0	50	10	20	40	40	50	32.8	13.9	18.8	46.7
DC08	USERSSYS	0	50	10	25	40	45	50	35.0	13.2	21.8	48.2
DC09	FTUSERS	0	50	30	40	50	50	50	44.4	7.3	37.2	51.7
DC10	WEEKMNTH	0	50	25	30	40	48	50	38.9	8.9	30.0	47.8
DC81	TOTAL	0	500	160	175	345	385	450	301.7	107.5	194.1	409.2

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	PRCD									
NUMBER OF	0	0	0	1	0	0	0	0	0	0
CLUSTERS	1	7	5	0	6	2	3	4	9	
	0	3	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0
9	*	*	*	*	*	*	*	*	*	*
8	*****		*	*	*	*	*	*	*	*
7	*****		*	*	*	*****		*	*	*
6	*****		*	*	*	*****			*	*
5	*****	*****		*	*	*****			*	*
4	*****	*****		*	*	*****			*	*
3	*****	*****	*****	*	*	*****			*	*
2	*****	*****	*****	*	*	*****			*	*
1	*****	*****	*****	*	*	*****			*	*

Figure A.1.3-3. Documentation: Cluster Map for 9 Large Systems

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Table A.1.3-6. Documentation: Summary Statistics for
11 Small Systems

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
DC01	SELFOMS	0	50	10	10	20	40	40	23.6	13.6	10.0	37.3
DC02	DSGNDCC	0	50	10	30	40	50	50	35.5	14.4	21.1	49.9
DC03	DSGNDCSN	0	50	0	0	20	30	50	20.0	16.7	3.3	36.7
DC04	SEMIQA	0	50	5	25	25	40	50	29.1	11.8	17.3	40.9
DC05	ACTNOTBK	0	50	10	40	40	40	50	39.1	10.4	28.6	49.5
DC06	UNITDEVF	0	50	0	0	0	0	0	0.0	0.0	0.0	0.0
DC07	TESTPLAN	0	50	10	10	35	40	50	30.0	14.3	15.7	44.3
DC08	USERSSYS	0	50	30	40	40	50	50	41.8	6.0	35.8	47.8
DC09	FTUSERS	0	50	20	50	50	50	50	47.3	9.0	38.2	56.3
DC10	WEEKMNTH	0	50	30	40	40	40	50	40.0	4.5	35.5	44.5
DCB1	TOTAL	0	500	175	270	330	350	390	306.4	62.6	243.8	369.0

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	PRCO										
NUMBER OF	0	0	0	0	0	0	0	0	0	0	1
CLUSTERS	6	6	7	7	7	8	7	7	7	7	1
	2	3	1	4	2	0	5	6	8	7	0
	0	0	0	0	0	0	0	0	0	0	0
11	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*****	*	*	*	*	*	*	*	*
9	*	*	*****	*****	*	*	*	*	*	*	*
8	*	*	*****	*****	*	*	*	*****	*	*	*
7	*****	*****	*****	*****	*	*	*	*****	*	*	*
6	*****	*****	*****	*****	*	*	*	*****	*****	*****	*****
5	*****	*****	*****	*****	*	*	*	*****	*****	*****	*****
4	*****	*****	*****	*****	*	*	*	*****	*****	*****	*****
3	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
2	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****

Figure A.1.3-4. Documentation: Cluster Map
for 11 Small Systems

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A.1.4 SOFTWARE ENGINEERING METHODOLOGY

--	Objective	--	X	--	Subjective
--	Absolute	--	X	--	Relative
--	Explicit	--	X	--	Derived
--	Static	--	X	--	Dynamic
--	Predictive	--	X	--	Explanatory

This category comprises the weighted sum of the Practices and Techniques, Tools, and Documentation categories.

The remainder of this subsection contains tables and figures that describe the Software Engineering Methodology measures with brief phrases, raw numbers, simple statistics, and graphics. These tables and figures include

- Descriptions of the measures with code numbers, mnemonic names, acceptable values, and brief phrases (Table A.1.4-1)
- Values of the measures for 25 systems (Table A.1.4-2), where large values indicate a high degree of use
- Summary statistics for 11 projects (Table A.1.4-3)
- Cluster map for 11 projects (Figure A.1.4-1)
- Summary statistics for 20 independent systems (Table A.1.4-4)
- Cluster map for 20 independent systems (Figure A.1.4-2)
- Summary statistics for 9 large systems (Table A.1.4-5)
- Cluster map for 9 large systems (Figure A.1.4-3)
- Summary statistics for 11 small systems (Table A.1.4-6)
- Cluster map for 11 small systems (Figure A.1.4-4)

Table A.1.4-1. Software Engineering Total: Description of Measures

<u>Code</u>	<u>Measure</u>	<u>Range</u>		<u>Description</u>
		<u>Low</u>	<u>High</u>	
SE81	SWENGNER	0000	2000	Sum MT84, TS81*500/600, DC81

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Table A.1.4-2. Software Engineering Total: Values of the
Measures for 25 Systems

PRCO	SEB1
0100	1283
0200	530
0300	573
0400	617
0500	1430
0600	1493
0700	1017
0800	1482
0900	902
1000	1152
1100	900
9000	993
0610	1523
0620	1172
0630	1264
0631	1490
0632	692
0710	1020
0720	1275
0730	1046
0740	897
0750	625
0760	892
0770	1142
0780	1025

Table A.1.4-3. Software Engineering Total: Summary Statistics for 11 Projects

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
SE81	SWENGNER	0	2000	530	617	1017	1430	1493	1034.5	363.3	671.1	1397.8

NUMBER OF CLUSTERS	PRCO										
	0	1	0	0	0	0	0	0	0	0	1
	1	0	5	6	8	2	3	4	7	9	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
11	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*	*	*	*	*	*	*	*
9	*	*	*	*	*	*	*	*	*	*	*
8	*	*	*	*	*	*	*	*	*	*	*
7	*	*	*	*	*	*	*	*	*	*	*
6	*	*	*	*	*	*	*	*	*	*	*
5	*	*	*	*	*	*	*	*	*	*	*
4	*	*	*	*	*	*	*	*	*	*	*
3	*	*	*	*	*	*	*	*	*	*	*
2	*	*	*	*	*	*	*	*	*	*	*
1	*	*	*	*	*	*	*	*	*	*	*

Figure A.1.4-1. Software Engineering Total: Cluster Map for 11 Projects

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Table A.1.4-4. Software Engineering Total: Summary Statistics for
20 Independent Systems

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
SE81	SWENGNER	0	2000	530	893	1036	1272	1523	1037.5	298.8	738.7	1336.3

NUMBER OF CLUSTERS	PRCO																			
	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	1	7	6	6	7	0	5	6	8	2	3	4	7	7	7	7	7	7	9	1
	0	2	3	2	7	0	0	1	0	0	0	0	5	1	8	3	4	6	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
19	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
18	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
17	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
16	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
15	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
14	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
13	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
12	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
11	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
9	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
8	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
7	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
6	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
5	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
4	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
3	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
1	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

Figure A.1.4-2. Software Engineering Total: Cluster Map for
20 Independent Systems

Table A.1.4-5. Software Engineering Total: Summary
Statistics for 9 Large Systems

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
SEB1	SWENGNER	0	2000	530	595	1046	1357	1523	1006.2	374.7	631	1380.9

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	PRCO									
NUMBER OF	0	0	1	0	0	0	0	0	0	0
CLUSTERS	1	7	0	5	6	2	3	4	9	
	0	3	0	0	1	0	0	0	0	
	0	0	0	0	0	0	0	0	0	
9	*	*	*	*	*	*	*	*	*	*
8	*	*	*	*	*	*****	*	*	*	*
7	*	*	*	*	*	*****	*	*	*	*
6	*	*	*	*****	*****	*****	*	*	*	*
5	*	*****	*****	*****	*****	*****	*	*	*	*
4	*****	*****	*****	*****	*****	*****	*	*	*	*
3	*****	*****	*****	*****	*****	*****	*	*	*	*
2	*****	*****	*****	*****	*****	*****	*	*	*	*
1	*****	*****	*****	*****	*****	*****	*	*	*	*

Figure A.1.4-3. Software Engineering Total: Cluster Map for 9 Large Systems

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Table A.1.4-6. Software Engineering Total: Summary Statistics
for 11 Small Systems

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
SEB1	SWENGNER	0	2000	625	897	1025	1264	1482	1063.1	236.1	827 0	1299 2

NUMBER OF CLUSTERS	PRCO										
	0	0	0	0	0	0	0	0	1	0	0
	6	7	6	7	8	7	7	7	1	7	7
	2	7	3	2	0	1	8	4	0	6	5
	0	0	0	0	0	0	0	0	0	0	0
11	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*	*	*	*	*	*	*	*
9	*	*	*	*	*	*	*	*	*	*	*
8	*	*	*	*	*	*	*	*	*	*	*
7	*	*	*	*	*	*	*	*	*	*	*
6	*	*	*	*	*	*	*	*	*	*	*
5	*	*	*	*	*	*	*	*	*	*	*
4	*	*	*	*	*	*	*	*	*	*	*
3	*	*	*	*	*	*	*	*	*	*	*
2	*	*	*	*	*	*	*	*	*	*	*
1	*	*	*	*	*	*	*	*	*	*	*

Figure A.1.4-4. Software Engineering Total: Cluster Map
for 11 Small Systems

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A.2 DEVELOPMENT TEAM ABILITY CLASS OF MEASURES

The Development Team Ability class measures the

- Development Team's Experience With the Application (AP01 through AP15)
 - Sums (AP81 through AP84)
- Manager's Effectiveness (MG01 through MG35)
 - Preliminary Design (MG01 through MG06)
 - Detailed Design (MG07 through MG12)
 - Implementation (MG13 through MG18)
 - System Testing (MG19 through MG24)
 - Acceptance Testing (MG25 through MG30)
 - Stability (MG31 through MG35)
 - Sums (MG81 through MG93)
- Development Team's Performance (PF01 through PF40)
 - Design (PF01 through PF10)
 - Implementation (PF11 through PF20)
 - Testing (PF21 through PF30)
 - Overall (PF31 through PF40)
- Development Team's Ability
 - Sums (AB81 through AB92)

A.2.1 EXPERIENCE WITH APPLICATION

<u> X </u>	Objective	<u> X </u>	Subjective
<u> — </u>	Absolute	<u> X </u>	Relative
<u> — </u>	Explicit	<u> X </u>	Derived
<u> X </u>	Static	<u> — </u>	Dynamic
<u> X </u>	Predictive	<u> — </u>	Explanator

This category measures how familiar the development team is with the application. Development personnel are a part of the development environment. These measures are scaled values derived from objective data. For example, Participation in Design (AP11) is computed by scaling the percentage of the development team that participated in design as

follows. Fifty-percent participation is assigned a value of 0, 60-percent participation is assigned a value of 10, 70-percent participation is assigned a value of 20, and so on. They are static as long as the method of derivation remains unchanged. They are predictive measures as long as most development team members stay with the team.

The remainder of this subsection contains tables and figures that describe the Experience With Application measures with brief phrases, raw numbers, simple statistics, and graphics. These tables and figures include

- Descriptions of the measures with code numbers, mnemonic names, acceptable values, and brief phrases (Table A.2.1-1)
- Values of the measures for 25 systems (Table A.2.1-2), where large values indicate more experience
- Summary statistics for 11 projects (Table A.2.1-3)
- Cluster map for 11 projects (Figure A.2.1-1)
- Summary statistics for 20 independent systems (Table A.2.1-4)
- Cluster map for 20 independent systems (Figure A.2.1-2)
- Summary statistics for 9 large systems (Table A.2.1-5)
- Cluster map for 9 large systems (Figure A.2.1-3)
- Summary statistics for 11 small systems (Table A.2.1-6)
- Cluster map for 11 small systems (Figure A.2.1-4)

Table A.2.1-1. Experience With Application: Description of Measures

Code	Measure	Range		Description
		Low	High	
AP01	EXPERT1	00	50	Expert 1
AP02	EXPERT2	00	50	Expert 2
AP03	EXPERT3	00	50	Expert 3
AP04	EXPERT4	00	50	Expert 4
AP05	EXPERT5	00	50	Expert 5
AP06	PROJMGR	00	50	Project Manager
AP07	PROJLEAD	00	50	Project Leader
AP08	PROGRMER	00	50	Programmers
AP09	ANALYSTS	00	50	Analysts
AP10	REQSPART	00	50	Participation in Requirements Definition
AP11	DSGNPART	00	50	Participation in Design
AP12	TINTERAC	00	50	Team Interactions Before Project
AP13		00	00	Not Defined
AP14		00	00	Not Defined
AP15		00	00	Not Defined
AP81	EXPERTS	000	250	Sum AP01 Through AP05
AP82	TEAMEXP	000	150	Sum AP06 Through AP08
AP83	TEAMFAML	000	150	Sum AP10 Through AP12
AP84	TOTAL	000	600	Sum AP01 Through AP12

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Table A.2.1-2. Experience With Application: Values of the Measures for 25 Systems

PRCD	AP01	AP02	AP03	AP04	AP05	AP06	AP07	AP08	AP09	AP10
0100	10	0	50	40	0	50	20	30	40	10
0200	0	0	0	0	40	40	20	30	50	30
0300	5	0	30	5	0	30	20	25	40	30
0400	0	0	0	0	0	40	20	30	30	30
0500	0	0	50	50	40	30	20	50	40	0
0600	0	0	50	50	0	30	30	40	30	0
0700	0	0	40	0	40	40	20	35	50	10
0800	0	0	50	0	50	50	30	50	50	30
0900	0	0	10	0	20	30	10	50	40	0
1000	0	0	25	10	10	40	30	40	40	0
1100	0	0	25	0	10	40	10	20	40	0
9000	0	0	20	5	15	35	20	40	40	0
0610	0	0	50	50	0	30	30	40	30	0
0620	0	0	30	30	0	30	30	50	30	0
0630	0	0	40	40	0	40	30	40	30	0
0631	0	0	50	50	0	30	30	40	30	0
0632	0	0	10	10	0	50	10	10	30	0
0710	0	0	30	0	20	40	20	40	50	10
0720	0	0	30	0	50	40	20	50	50	10
0730	0	0	40	0	20	40	30	20	50	10
0740	0	0	20	0	20	40	20	0	50	10
0750	0	0	20	0	20	40	20	0	50	10
0760	0	0	30	0	50	40	20	50	50	10
0770	0	0	20	0	20	40	20	50	50	10
0780	0	0	30	0	0	40	10	30	50	0

PRCD	AP11	AP12	AP81	AP82	AP83	AP84
0100	30	20	100	100	60	260
0200	20	20	40	90	70	200
0300	20	30	40	75	80	195
0400	20	50	0	90	100	190
0500	50	40	140	100	90	330
0600	10	20	100	100	30	230
0700	10	30	80	95	50	225
0800	10	0	100	130	40	270
0900	20	10	30	90	30	150
1000	20	50	45	110	70	225
1100	50	30	35	70	80	185
9000	25	30	40	95	55	190
0610	20	20	100	100	40	240
0620	50	30	60	110	80	250
0630	30	10	80	110	40	230
0631	30	10	100	100	40	240
0632	50	10	20	70	60	150
0710	30	10	50	100	50	200
0720	50	30	80	110	90	280
0730	30	0	60	90	40	190
0740	50	0	40	60	60	160
0750	10	0	40	60	20	120
0760	30	0	80	110	40	230
0770	30	10	40	110	50	200
0780	30	0	30	80	30	140

Table A.2.1-3. Experience With Application: Summary Statistics for 11 Projects

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
AP01	EXPERT1	0	50	0	0	0	0	10	1.4	3.2	-1.9	4.6
AP02	EXPERT2	0	50	0	0	0	0	0	0.0	0.0	0.0	0.0
AP03	EXPERT3	0	50	0	10	30	50	50	30.0	19.9	10.1	49.9
AP04	EXPERT4	0	50	0	0	0	40	50	14.1	21.3	-7.2	35.4
AP05	EXPERT5	0	50	0	0	10	40	50	19.1	19.7	-0.6	38.8
AP06	PROJMG	0	50	30	30	40	40	50	38.2	7.5	30.7	45.7
AP07	PROJLEAD	0	50	10	20	20	30	30	20.9	7.0	13.9	27.9
AP08	PROGRMER	0	50	20	30	35	50	50	36.4	10.5	25.9	46.9
AP09	ANALYSTS	0	50	30	40	40	50	50	40.9	7.0	33.9	47.9
AP10	REQSPART	0	50	0	0	10	30	30	12.7	14.2	-1.5	26.9
AP11	DSGNPART	0	50	10	10	20	30	50	23.6	14.3	9.3	38.0
AP12	TINTERAC	0	50	0	20	30	40	50	27.3	15.6	11.7	42.8
AP81	EXPERTS	0	250	0	35	45	100	140	64.5	41.9	22.7	106.4
AP82	TEAMEXP	0	150	70	90	95	100	130	95.5	16.2	79.3	111.6
AP83	TEAMFAML	0	150	30	40	70	80	100	63.6	23.8	39.9	87.4
AP84	TOTAL	0	600	150	190	225	260	330	223.6	49.2	174.4	272.9

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	PRCO										
NUMBER OF CLUSTERS	0	0	0	1	0	0	0	0	1	0	0
	1	6	7	0	8	5	2	3	1	4	9
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
11	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*	*	*	*	*	*	*	*
9	*****	*	*	*	*	*	*	*	*	*	*
8	*****	*****	*	*	*	*	*	*	*	*	*
7	*****	*****	*	*	*	*	*	*	*	*	*
6	*****	*****	*	*	*	*	*	*	*	*	*
5	*****	*****	*	*	*	*	*	*	*	*	*
4	*****	*****	*	*	*	*	*	*	*	*	*
3	*****	*****	*	*	*	*	*	*	*	*	*
2	*****	*****	*	*	*	*	*	*	*	*	*
1	*****	*****	*	*	*	*	*	*	*	*	*

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Figure A.2.1-1: Experience With Application: Cluster Map for 11 Projects

Table A.2.1-4. Experience With Application: Summary Statistics for 20 Independent Systems

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
AP01	EXPERT1	0	50	0	0	0	0	10	0.8	2.4	-1.7	3.2
AP02	EXPERT2	0	50	0	0	0	0	0	0.0	0.0	0.0	0.0
AP03	EXPERT3	0	50	0	20	30	40	50	29.0	15.1	13.9	44.1
AP04	EXPERT4	0	50	0	0	0	25	50	11.3	18.8	-7.5	30.0
AP05	EXPERT5	0	50	0	0	20	35	50	18.5	18.4	0.1	36.9
AP06	PROJMG	0	50	30	33	40	40	50	38.5	5.9	32.6	44.4
AP07	PROJLEAD	0	50	10	20	20	30	30	21.5	6.7	14.8	28.2
AP08	PROGRMER	0	50	0	26	40	50	50	34.8	15.9	18.9	50.6
AP09	ANALYSTS	0	50	30	40	45	50	50	43.0	8.0	35.0	51.0
AP10	REQSPART	0	50	0	0	10	10	30	10.0	11.2	-1.2	21.2
AP11	DSGNPART	0	50	10	20	30	45	50	30.0	13.4	16.6	43.4
AP12	TINTERAC	0	50	0	0	15	30	50	18.0	16.7	1.3	34.7
AP81	EXPERTS	0	250	0	40	48	80	140	59.5	33.0	26.5	92.5
AP82	TEAMEXP	0	150	60	83	100	110	130	94.8	18.5	76.3	113.2
AP83	TEAMFAML	0	150	20	40	55	80	100	58.0	23.3	34.7	81.3
AP84	TOTAL	0	600	120	186	200	248	330	212.3	51.2	161.0	263.5

	PRCO																			
NUMBER OF CLUSTERS	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	1	6	6	6	0	7	7	8	5	2	3	1	7	7	7	4	7	7	7	9
	0	1	3	2	0	2	6	0	0	0	0	0	1	7	3	0	4	5	8	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
19	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
18	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
17	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
16	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
15	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
14	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
13	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
12	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
11	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
9	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
8	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
7	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
6	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
5	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
4	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
3	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
1	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

Figure A.2.1-2. Experience With Application: Cluster Map for 20 Independent Systems

Table A.2.1-5. Experience With Application: Summary Statistics
for 9 Large Systems

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
AP01	EXPERT1	0	50	0	0	0	3	10	1.7	3.5	-1.9	5.2
AP02	EXPERT2	0	50	0	0	0	0	0	0.0	0.0	0.0	0.0
AP03	EXPERT3	0	50	0	5	30	50	50	28.3	20.9	7.4	49.2
AP04	EXPERT4	0	50	0	0	5	45	50	17.2	22.5	-5.3	39.7
AP05	EXPERT5	0	50	0	0	10	30	40	14.4	16.7	-2.2	31.1
AP06	PROJMG	0	50	30	30	40	40	50	36.7	7.1	29.6	43.7
AP07	PROJLEAD	0	50	10	20	20	30	30	22.2	6.7	15.6	28.9
AP08	PROGRMER	0	50	20	28	30	45	50	35.0	10.6	24.4	45.6
AP09	ANALYSTS	0	50	30	35	40	45	50	40.0	7.1	32.9	47.1
AP10	REQSPART	0	50	0	0	10	30	30	12.2	13.9	-1.7	26.2
AP11	DSGNPART	0	50	20	20	20	30	50	25.6	10.1	15.4	35.7
AP12	TINTERAC	0	50	0	15	20	45	50	26.7	17.3	9.3	44.0
AP81	EXPERTS	0	250	0	35	45	100	140	61.7	43.4	18.2	105.1
AP82	TEAMEXP	0	150	75	90	90	100	110	93.9	9.9	84.0	103.8
AP83	TEAMFAML	0	150	30	40	70	85	100	64.4	24.0	40.4	88.5
AP84	TOTAL	0	600	150	190	200	250	330	220.0	52.3	167.7	272.3

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	PRCO									
NUMBER OF	0	0	0	0	0	0	1	0	0	
CLUSTERS	1	6	5	2	3	7	0	9	4	
	0	1	0	0	0	3	0	0	0	
	0	0	0	0	0	0	0	0	0	
9	*	*	*	*	*	*	*	*	*	*
8	*****		*	*	*	*	*	*	*	*
7	*****		*	*****		*	*	*	*	*
6	*****		*	*****		*	*	*	*	*
5	*****		*	*****		*	*	*	*	*
4	*****		*	*****		*	*	*	*	*
3	*****		*	*****		*	*	*	*	*
2	*****		*	*****		*	*	*	*	*
1	*****		*	*****		*	*	*	*	*

Figure A.2.1-3. Experience With Application: Cluster Map for 9 Large Systems

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Table A.2.1-6. Experience With Application: Summary Statistics
for 11 Small Systems

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
AP01	EXPERT1	0	50	0	0	0	0	0	0.0	0.0	0.0	0.0
AP02	EXPERT2	0	50	0	0	0	0	0	0.0	0.0	0.0	0.0
AP03	EXPERT3	0	50	20	20	30	30	50	29.5	9.1	20.5	38.6
AP04	EXPERT4	0	50	0	0	0	0	40	6.4	14.3	-8.0	20.7
AP05	EXPERT5	0	50	0	0	20	50	50	21.8	19.9	1.9	41.7
AP06	PROJMGR	0	50	30	40	40	40	50	40.0	4.5	35.5	44.5
AP07	PROJLEAD	0	50	10	20	20	30	30	20.9	7.0	13.9	27.9
AP08	PROGRMER	0	50	0	20	40	50	50	34.5	19.7	14.9	54.2
AP09	ANALYSTS	0	50	30	40	50	50	50	45.5	8.2	37.3	53.7
AP10	REQSPART	0	50	0	0	10	10	30	8.2	8.7	-0.6	16.9
AP11	DSGNPART	0	50	10	30	30	50	50	33.6	15.0	18.6	48.7
AP12	TINTERAC	0	50	0	0	10	30	30	10.9	13.0	-2.1	23.9
AP81	EXPERTS	0	250	30	40	50	80	100	57.7	23.6	34.1	81.3
AP82	TEAMEXP	0	150	60	70	110	110	130	95.5	23.8	71.6	119.3
AP83	TEAMFAML	0	150	20	40	50	80	90	52.7	22.4	30.3	75.1
AP84	TOTAL	0	600	120	160	200	250	280	205.9	52.0	153.9	257.9

	PRCO										
NUMBER OF	0	0	0	0	0	0	0	0	1	0	0
CLUSTERS	6	6	7	7	7	7	8	7	1	7	7
	2	3	1	7	6	2	0	4	0	5	8
	0	0	0	0	0	0	0	0	0	0	0
11	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*****	*	*	*	*	*	*	*	*
9	*	*	*****	*	*	*	*	*****	*	*	*
8	*	*	*****	*	*	*	*	*****	*****	*****	*****
7	*****	*****	*****	*	*	*	*	*****	*****	*****	*****
6	*****	*****	*****	*****	*	*	*	*****	*****	*****	*****
5	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
4	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
3	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
2	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****

Figure A.2.1-4. Experience With Application: Cluster Map
for 11 Small Systems

A.2.2 EFFECTIVENESS OF MANAGEMENT

-	-	-	Objective	-	X	-	Subjective
-	-	-	Absolute	-	X	-	Relative
-	-	-	Explicit	-	X	-	Derived
-	X	-	Static	-	-	-	Dynamic
-	X	-	Predictive	-	-	-	Explanatory

This category measures how well development team managers direct the project. Development team managers are a part of the development environment. These measures are subjective because they are simple relative ratings of each type of manager. They are static as long as no extreme new cases are added to the sample. They are predictive as long as the managers maintain their same level of performance. The stability subcategory (MG31 through MG35) is explanatory because it measures the number of managers involved with the project; however, typical, average, or trend predictive values can be extracted from the samples.

The remainder of this subsection contains tables and figures that describe the Effectiveness of Management measures with brief phrases, raw numbers, simple statistics, and graphics. These tables and figures include

- Descriptions of the measures with code numbers, mnemonic names, acceptable values, and brief phrases (Table A.2.2-1)
- Values of the measures for 25 systems (Table A.2.2-2), where large values indicate better management
- Summary statistics for 11 projects (Table A.2.2-3)
- Cluster map for 11 projects (Figure A.2.2-1)
- Summary statistics for 20 independent systems (Table A.2.2-4)
- Cluster map for 20 independent systems (Figure A.2.2-2)

- Summary statistics for 9 large systems
(Table A.2.2-5)
- Cluster map for 9 large systems (Figure A.2.2-3)
- Summary statistics for 11 small systems
(Table A.2.2-6)
- Cluster map for 11 small systems (Figure A.2.2-4)

Table A.2.2-1. Effectiveness of Management: Description of Measures (1 of 2)

Code	Measure	Range		Description
		Low	High	
Preliminary Design				
MG01	PDPJMGR	00	50	Project Manager
MG02	PDPJLEAD	00	50	Project Leader
MG03	PDANMGR	00	50	Analysis Manager
MG04	PDANLEAD	00	50	Analysis Leader
MG05	PDDVMGR	00	50	Development Manager
MG06	PDDVLEAD	00	50	Development Leader
Detailed Design				
MG07	DDPJMGR	00	50	Project Manager
MG08	DDPJLEAD	00	50	Project Leader
MG09	DDANMGR	00	50	Analysis Manager
MG10	DDANLEAD	00	50	Analysis Leader
MG11	DDDVMGR	00	50	Development Manager
MG12	DDDVLEAD	00	50	Development Leader
Implementation				
MG13	IMPJMGR	00	50	Project Manager
MG14	IMPJLEAD	00	50	Project Leader
MG15	IMANMGR	00	50	Analysis Manager
MG16	IMANLEAD	00	50	Analysis Leader
MG17	IMDVMGR	00	50	Development Manager
MG18	IMDVLEAD	00	50	Development Leader
System Testing				
MG19	STPJMGR	00	50	Project Manager
MG20	STPJLEAD	00	50	Project Leader
MG21	STANMGR	00	50	Analysis Manager
MG22	STANLEAD	00	50	Analysis Leader
MG23	STDVMGR	00	50	Development Manager
MG24	STDVLEAD	00	50	Development Leader

Table A.2.2-1. Effectiveness of Management: Description of Measures (2 of 2)

Code	Measure	Range		Description
		Low	High	
Acceptance Testing				
MG25	ATPJMGR	00	50	Project Manager
MG26	ATPJLEAD	00	50	Project Leader
MG27	ATANMGR	00	50	Analysis Manager
MG28	ATANLEAD	00	50	Analysis Leader
MG29	ATDVMGR	00	50	Development Manager
MG30	ATDVLEAD	00	50	Development Leader
Stability				
MG31	SBPJMGR	00	50	Project Manager
MG32	SBPJLEAD	00	50	Project Leader
MG33	SBANMGR	00	50	Analysis Manager
MG34	SBANLEAD	00	50	Analysis Leader
MG35	SBOTHER	00	50	Other Changes
MG81	PRELIMD	000	300	Sum MG01 Through MG06
MG82	DETAILD	000	300	Sum MG07 Through MG12
MG83	IMPLMENT	000	300	Sum MG13 Through MG18
MG84	SYSTEM	000	300	Sum MG19 Through MG24
MG85	ACCEPT	000	300	Sum MG25 Through MG30
MG86	STABILTY	000	250	Sum MG31 Through MG35
MG87	PROJMGR	000	250	Sum MG01, MG07, MG13, MG19, MG25
MG88	PROJLEAD	000	250	Sum MG02, MG08, MG14, MG20, MG26
MG89	ANLYSMGR	000	250	Sum MG03, MG09, MG15, MG21, MG27
MG90	ANLYSLED	000	250	Sum MG04, MG10, MG16, MG22, MG28
MG91	DEVPMGR	000	250	Sum MG05, MG11, MG17, MG23, MG29
MG92	DEVLEAD	000	250	Sum MG06, MG12, MG18, MG24, MG30
MG93	TOTAL	0000	1750	Sum MG01 Through MG35

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Table A.2.2-2. Effectiveness of Management: Values of the
Measures for 25 Systems (1 of 3)

PRCD	MG01	MG02	MG03	MG04	MG05	MG06	MG07	MG08	MG09	MG10
0100	20	30	30	25	40	40	40	50	20	25
0200	0	30	40	40	20	20	0	30	40	40
0300	0	0	0	40	20	30	0	0	0	40
0400	0	0	0	0	20	40	15	30	0	40
0500	50	50	0	30	50	50	50	50	0	30
0600	50	50	10	40	40	40	50	50	10	20
0700	50	40	0	30	40	40	50	40	10	35
0800	50	50	0	40	50	50	50	50	0	40
0900	50	20	0	40	50	50	50	20	0	40
1000	50	50	0	40	50	50	50	30	0	40
1100	50	20	0	40	40	40	50	20	0	40
9000	50	35	0	40	50	50	50	25	0	40
0610	50	50	10	40	40	40	50	50	10	20
0620	50	50	10	40	40	40	50	40	10	20
0630	50	40	20	40	20	20	40	40	20	40
0631	50	50	20	40	20	20	50	50	20	40
0632	50	50	20	40	40	40	40	40	20	40
0710	50	30	0	30	40	40	50	30	10	35
0720	50	50	0	30	40	40	50	50	10	35
0730	50	35	0	30	40	40	50	35	10	35
0740	50	30	0	30	40	40	50	30	10	35
0750	50	30	0	30	40	40	50	30	10	35
0760	50	50	0	30	40	40	50	50	10	35
0770	50	30	0	30	40	40	50	30	10	35
0780	30	35	20	40	40	40	30	35	20	40

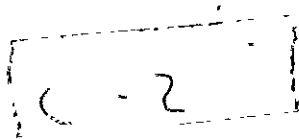
PRCD	MG11	MG12	MG13	MG14	MG15	MG16	MG17	MG18	MG19	MG20
0100	40	40	40	50	20	25	40	40	50	50
0200	20	20	0	30	40	40	10	10	30	30
0300	20	30	30	15	0	40	30	40	50	30
0400	20	30	30	30	0	40	10	20	30	30
0500	50	50	50	50	0	40	40	40	50	50
0600	40	40	50	50	15	20	30	40	50	50
0700	40	40	50	40	20	40	40	40	50	40
0800	50	50	50	50	20	40	50	50	50	50
0900	50	50	0	20	20	40	40	30	30	20
1000	50	40	30	40	20	40	40	30	50	40
1100	40	40	20	20	20	40	40	40	50	20
9000	50	45	15	30	20	40	40	30	40	30
0610	40	40	50	50	15	20	30	40	50	50
0620	40	40	50	40	15	20	30	40	50	40
0630	20	20	40	40	20	40	20	20	40	40
0631	20	20	50	50	20	40	20	20	50	50
0632	50	50	40	40	20	40	50	50	40	40
0710	40	40	50	30	20	40	40	40	50	30
0720	40	40	50	50	20	40	40	40	50	50
0730	40	40	50	35	20	40	40	40	50	35
0740	40	40	50	30	20	40	40	40	50	30
0750	40	40	50	30	20	40	40	40	50	30
0760	40	40	50	50	20	40	40	40	50	50
0770	40	40	50	30	20	40	40	40	50	30
0780	40	40	50	35	20	40	40	40	50	35

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Table A.2.2-2. Effectiveness of Management: Values of the Measures for 25 Systems (2 of 3)

PRCD	MG21	MG22	MG23	MG24	MG25	MG26	MG27	MG28	MG29	MG30
0100	10	25	40	40	50	50	20	30	40	40
0200	0	40	0	0	30	30	0	40	0	0
0300	0	20	40	50	50	30	10	30	40	50
0400	0	40	0	10	30	30	10	40	0	0
0500	0	40	40	40	50	50	0	40	40	40
0600	20	30	20	30	50	50	30	40	20	20
0700	20	40	30	30	50	40	20	40	30	30
0800	40	40	50	50	50	50	40	40	50	50
0900	30	30	40	10	30	20	30	30	40	10
1000	30	30	40	30	50	40	30	30	40	30
1100	30	40	40	40	50	20	30	40	40	40
9000	30	30	40	20	40	30	30	30	40	20
0610	20	30	20	30	50	50	30	40	20	20
0620	20	30	10	20	50	40	30	40	10	10
0630	20	40	0	0	40	40	20	40	10	10
0631	20	40	0	0	50	50	20	40	10	10
0632	20	40	50	50	40	40	20	40	50	50
0710	20	40	30	30	50	30	20	40	30	30
0720	20	40	30	30	50	50	20	40	30	30
0730	20	40	30	30	50	35	20	40	30	30
0740	20	40	30	30	50	30	20	40	30	30
0750	20	40	30	30	50	30	20	40	30	30
0760	20	40	30	30	50	50	20	40	30	30
0770	20	40	30	30	50	30	20	40	30	30
0780	20	40	40	40	50	35	20	40	40	40

PRCD	MG31	MG32	MG33	MG34	MG35
0100	0	50	0	50	0
0200	0	50	0	50	25
0300	20	10	50	0	20
0400	40	40	50	40	20
0500	50	50	50	20	20
0600	50	50	10	0	20
0700	50	50	30	10	25
0800	50	50	20	20	20
0900	30	50	20	20	15
1000	30	20	20	20	0
1100	30	50	20	20	10
9000	30	35	20	20	10
0610	50	50	10	0	20
0620	50	50	10	0	20
0630	50	50	50	50	35
0631	50	50	50	50	35
0632	50	50	50	50	35
0710	50	50	30	10	25
0720	50	50	30	10	25
0730	50	50	30	10	25
0740	50	50	30	10	25
0750	50	50	30	10	25
0760	50	50	30	10	25
0770	50	50	30	10	25
0780	50	50	50	50	35



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Table A.2.2-2. Effectiveness of Management: Values of the Measures for 25 Systems (3 of 3)

PRCO	MG81	MG82	MG83	MG84	MG85	MG86	MG87	MG88	MG89	MG90	MG91	MG92	MG93
0100	185	215	215	215	230	100	200	230	100	130	160	200	1160
0200	150	150	130	100	100	125	60	150	120	200	40	50	755
0300	90	90	155	190	210	100	130	75	10	170	120	200	835
0400	60	135	130	110	110	190	105	120	10	160	40	100	735
0500	230	230	220	220	220	190	250	250	0	180	180	220	1310
0600	230	210	205	200	210	130	250	250	85	150	120	170	1185
0700	200	215	230	210	210	165	250	200	70	185	140	180	1230
0800	240	240	260	280	280	160	250	250	100	200	200	250	1460
0900	210	210	150	160	160	135	160	100	80	180	180	150	1025
1000	240	210	200	220	220	90	230	200	80	180	180	180	1180
1100	190	190	180	220	220	130	220	100	80	200	160	200	1130
9000	225	210	175	190	190	115	195	150	80	180	180	165	1105
0610	230	210	205	200	210	130	250	250	85	150	120	170	1185
0620	230	200	195	170	180	130	250	210	85	150	100	150	1105
0630	190	180	180	140	160	235	210	200	100	200	50	70	1085
0631	200	200	200	160	180	235	250	250	100	200	50	70	1175
0632	240	240	240	240	240	235	210	210	100	200	150	240	1435
0710	190	205	220	200	200	165	250	150	70	185	140	180	1180
0720	210	225	240	220	220	165	250	250	70	185	140	180	1280
0730	195	210	225	205	205	165	250	175	70	185	140	180	1205
0740	190	205	220	200	200	165	250	150	70	185	140	180	1180
0750	190	205	220	200	200	165	250	150	70	185	140	180	1180
0760	210	225	240	220	220	165	250	250	70	185	140	180	1280
0770	190	205	220	200	200	165	250	150	70	185	140	180	1180
0780	205	205	225	225	225	235	210	175	100	200	160	200	1320

Table A.2.2-3. Effectiveness of Management: Summary Statistics
for 11 Projects (1 of 2)

CODE	NAME	--ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
MG01	PDPJMGR	0	50	0	0	50	50	50	33.6	23.4	10.3	57.0
MG02	PDPJLEAD	0	50	0	20	30	50	50	30.9	19.2	11.7	50.1
MG03	PDANMGR	0	50	0	0	0	10	40	7.3	14.2	-6.9	21.5
MG04	PDANLEAD	0	50	0	30	40	40	40	33.2	12.3	20.9	45.5
MG05	PDDVMGR	0	50	20	20	40	50	50	38.2	12.5	25.7	50.7
MG06	PDDVLEAD	0	50	20	40	40	50	50	40.9	9.4	31.5	50.3
MG07	DDPJMGR	0	50	0	15	50	50	50	36.8	21.0	15.8	57.8
MG08	DDPJLEAD	0	50	0	20	30	50	50	33.6	16.3	17.3	49.9
MG09	DDANMGR	0	50	0	0	0	10	40	7.3	12.7	-5.4	20.0
MG10	DDANLEAD	0	50	20	30	40	40	40	35.5	7.2	28.2	42.7
MG11	DDDVMGR	0	50	20	20	40	50	50	38.2	12.5	25.7	50.7
MG12	DDDVLEAD	0	50	20	30	40	50	50	39.1	9.4	29.7	48.5
MG13	IMPJMGR	0	50	0	20	30	50	50	31.8	18.9	12.9	50.7
MG14	IMPJLEAD	0	50	15	20	40	50	50	35.9	13.6	22.3	49.5
MG15	IMANMGR	0	50	0	0	20	20	40	15.9	12.0	3.9	27.9
MG16	IMANLEAD	0	50	20	40	40	40	40	36.8	7.2	29.7	44.0
MG17	IMDVMGR	0	50	10	30	40	40	50	33.6	12.9	20.8	46.5
MG18	IMDVLEAD	0	50	10	30	40	40	50	34.5	11.3	23.3	45.8
MG19	STPJMGR	0	50	30	30	50	50	50	44.5	9.3	35.2	53.9
MG20	STPJLEAD	0	50	20	30	40	50	50	37.3	11.9	25.4	49.2
MG21	STANMGR	0	50	0	0	20	30	40	16.4	15.0	1.3	31.4
MG22	STANLEAD	0	50	20	30	40	40	40	34.1	7.4	26.7	41.4
MG23	STDVMGR	0	50	0	20	40	40	50	30.9	17.0	13.9	47.9
MG24	STDVLEAD	0	50	0	10	30	40	50	30.0	16.7	13.3	46.7
MG25	ATPJMGR	0	50	30	30	50	50	50	44.5	9.3	35.2	53.9
MG26	ATPJLEAD	0	50	20	30	40	50	50	37.3	11.9	25.4	49.2
MG27	ATANMGR	0	50	0	10	20	30	40	20.0	13.4	6.6	33.4
MG28	ATANLEAD	0	50	30	30	40	40	40	36.4	5.0	31.3	41.4
MG29	ATDVMGR	0	50	0	20	40	40	50	30.9	17.0	13.9	47.9
MG30	ATDVLEAD	0	50	0	10	30	40	50	28.2	18.3	9.8	46.5
MG31	SBPJMGR	0	50	0	20	30	50	50	31.8	18.9	12.9	50.7
MG32	SBPJLEAD	0	50	10	40	50	50	50	42.7	14.2	28.5	56.9
MG33	SBANMGR	0	50	0	10	20	50	50	24.5	18.6	5.9	43.2
MG34	SBANLEAD	0	50	0	10	20	40	50	22.7	17.4	5.4	40.1
MG35	SBOTHER	0	50	0	10	20	20	25	15.9	8.9	7.0	24.8
MG81	PRELIMD	0	300	60	150	200	230	240	184.1	60.7	123.4	244.8
MG82	DETAILD	0	300	90	150	210	215	240	190.5	46.0	144.4	236.5
MG83	IMPLMENT	0	300	130	150	200	220	260	188.6	43.0	145.7	231.6
MG84	SYSTEM	0	300	100	160	210	220	280	193.2	52.2	141.0	245.3
MG85	ACCEPT	0	300	100	160	210	220	280	197.3	53.3	144.0	250.6
MG86	STABILITY	0	250	90	100	130	165	190	137.7	34.8	102.9	172.5
MG87	PROJMGR	0	250	60	130	220	250	250	191.4	67.5	123.8	258.9
MG88	PROJLEAD	0	250	75	100	200	250	250	175.0	67.9	107.1	242.9
MG89	ANLYSMGR	0	250	0	10	80	100	120	66.8	41.0	25.8	107.8
MG90	ANLYSLED	0	250	130	160	180	200	200	175.9	22.2	153.7	198.1

Table A.2.2-3. Effectiveness of Management: Summary Statistics
for 11 Projects (2 of 2)

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
MG91	DEVMGR	0	250	40	120	160	180	200	138.2	54.7	83.4	192.9
MG92	DEVLEAD	0	250	50	150	180	200	250	172.7	56.1	116.7	228.8
MG93	TOTAL	0	1750	735	835	1160	1230	1460	1091.4	231.5	859.8	1322.9

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NUMBER OF CLUSTERS	PRCO										
	0	0	0	1	0	1	0	0	0	0	0
	1	6	7	0	9	1	5	8	2	4	3
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
11	*	*	*	*	*	*	*	*	*	*	*
10	*	*****	*	*	*	*	*	*	*	*	*
9	*	*****	*	*	*	*	*	*	*	*	*
8	*****	*	*	*	*	*	*	*	*	*	*
7	*****	*****	*	*	*	*	*	*	*	*	*
6	*****	*****	*	*	*****	*	*	*****	*	*	*
5	*****	*****	*****	*****	*****	*****	*****	*****	*	*	*
4	*****	*****	*****	*****	*****	*****	*****	*****	*	*	*
3	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*
2	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*
1	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*

Figure A.2.2-1. Effectiveness of Management: Cluster Map for 11 Projects.

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Table A.2.2-4. Effectiveness of Management: Summary Statistics for
20 Independent Systems (1 of 2)

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
MG01	PDPJMGR	0	50	0	35	50	50	50	40.0	18.9	21.1	58.9
MG02	PDPJLEAD	0	50	0	30	33	50	50	34.0	15.6	18.4	49.6
MG03	PDANMGR	0	50	0	0	0	10	40	6.5	11.8	-5.3	18.3
MG04	PDANLEAD	0	50	0	30	35	40	40	33.3	9.5	23.8	42.7
MG05	PDDVMGR	0	50	20	40	40	40	50	38.0	10.1	27.9	48.1
MG06	PDDVLEAD	0	50	20	40	40	40	50	39.5	8.3	31.2	47.8
MG07	DDPJMGR	0	50	0	40	50	50	50	41.3	16.7	24.6	57.9
MG08	DDPJLEAD	0	50	0	30	33	50	50	35.0	13.1	21.9	48.1
MG09	DDANMGR	0	50	0	0	10	10	40	9.5	10.0	-0.5	19.5
MG10	DDANLEAD	0	50	20	35	35	40	40	35.0	6.5	28.5	41.5
MG11	DDVVMGR	0	50	20	40	40	40	50	38.0	10.1	27.9	48.1
MG12	DDDVLEAD	0	50	20	40	40	40	50	38.5	8.1	30.4	46.6
MG13	IMPJMGR	0	50	0	30	50	50	50	39.5	16.4	23.1	55.9
MG14	IMPJLEAD	0	50	15	30	35	50	50	36.3	11.2	25.0	47.5
MG15	IMANMGR	0	50	0	16	20	20	40	17.5	9.0	8.5	26.5
MG16	IMANLEAD	0	50	20	40	40	40	40	37.3	6.8	30.5	44.0
MG17	IMDVMGR	0	50	10	30	40	40	50	35.0	10.5	24.5	45.5
MG18	IMDVLEAD	0	50	10	33	40	40	50	36.0	9.4	26.6	45.4
MG19	STPJMGR	0	50	30	50	50	50	50	46.5	7.5	39.0	54.0
MG20	STPJLEAD	0	50	20	30	35	50	50	37.0	10.2	26.8	47.2
MG21	STANMGR	0	50	0	13	20	20	40	18.0	11.1	6.9	29.1
MG22	STANLEAD	0	50	20	30	40	40	40	36.3	6.3	30.0	42.5
MG23	STDVMGR	0	50	0	23	30	40	50	28.5	15.0	13.5	43.5
MG24	STDVLEAD	0	50	0	23	30	40	50	28.5	14.2	14.3	42.7
MG25	ATPJMGR	0	50	30	50	50	50	50	46.5	7.5	39.0	54.0
MG26	ATPJLEAD	0	50	20	30	35	50	50	37.0	10.2	26.8	47.2
MG27	ATANMGR	0	50	0	20	20	30	40	20.5	10.0	10.5	30.5
MG28	ATANLEAD	0	50	30	40	40	40	40	38.0	4.1	33.9	42.1
MG29	ATDVMGR	0	50	0	23	30	40	50	29.0	14.1	14.9	43.1
MG30	ATDVLEAD	0	50	0	13	30	40	50	27.5	14.8	12.7	42.3
MG31	SBPJMGR	0	50	0	30	50	50	50	40.0	16.5	23.5	56.5
MG32	SBPJLEAD	0	50	10	50	50	50	50	46.0	11.0	35.0	57.0
MG33	SBANMGR	0	50	0	20	30	45	50	28.0	16.1	11.9	44.1
MG34	SBANLEAD	0	50	0	10	15	35	50	20.5	17.6	2.9	38.1
MG35	SBOther	0	50	0	20	23	25	35	20.8	9.1	11.7	29.8
MG81	PRELIM	0	300	60	190	193	225	240	191.3	45.7	145.5	237.0
MG82	DETAILD	0	300	90	193	205	214	240	197.3	35.3	162.0	232.5
MG83	IMPLMENT	0	300	130	180	218	224	260	201.5	36.6	164.9	238.1
MG84	SYSTEM	0	300	100	175	200	220	280	194.8	41.7	153.1	236.4
MG85	ACCEPT	0	300	100	185	208	220	280	198.5	40.9	157.6	239.4
MG86	STABILTY	0	250	90	130	165	165	235	155.3	39.4	115.9	194.6
MG87	PROJMGR	0	250	60	203	250	250	250	213.8	56.4	157.4	270.1
MG88	PROJLEAD	0	250	75	150	175	245	250	179.3	56.5	122.7	235.8
MG89	ANLYSMGR	0	250	0	70	75	96	120	72.0	31.5	40.5	103.5
MG90	ANLYSLED	0	250	130	173	185	196	200	179.8	19.2	160.6	198.9
MG91	DEVMGR	0	250	40	120	140	160	200	133.5	45.5	88.0	179.0

Table A.2.2-4. Effectiveness of Management: Summary Statistics for
20 Independent Systems (2 of 2)

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
MG92	DEVLEAD	0	250	50	155	180	200	250	170.0	47.8	122.2	217.8
MG93	TOTAL	0	1750	735	1090	1180	1261	1460	1138.5	183.6	954.9	1322.1

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NUMBER OF CLUSTERS	PRCO																			
	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	1	0	6	6	7	7	7	7	7	1	6	9	5	7	7	7	8	2	4	3
	0	0	1	2	1	4	5	7	3	0	3	0	0	2	6	8	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
19	*	*	*	*	*****	*		*	*	*	*	*	*	*	*	*	*	*	*	*
18	*	*	*	*	*****			*	*	*	*	*	*	*	*	*	*	*	*	*
17	*	*	*	*	*****	*****		*	*	*	*	*	*	*	*	*	*	*	*	*
16	*	*	*	*	*****	*****		*	*	*	*	*	*	*****	*	*	*	*	*	*
15	*	*	*	*	*****	*****		*	*	*	*	*	*	*****	*	*	*	*	*	*
14	*	*	*****		*****	*****		*	*	*	*	*	*	*****	*	*	*	*	*	*
13	*	*	*****		*****	*****		*	*	*	*	*	*	*****	*	*	*	*	*	*
12	*****		*****		*****	*****		*	*	*	*	*	*	*****	*	*	*	*	*	*
11	*****		*****		*****	*****		*	*	*	*	*	*	*****	*	*	*	*	*	*
10	*****		*****		*****	*****		*	*	*	*	*	*	*****	*	*	*	*	*	*
9	*****		*****		*****	*****		*	*	*	*	*	*	*****	*	*	*	*	*	*
8	*****		*****		*****	*****		*	*	*	*	*	*	*****	*	*	*	*	*	*
7	*****		*****		*****	*****		*	*	*	*	*	*	*****	*	*	*	*	*	*
6	*****		*****		*****	*****		*	*	*	*	*	*	*****	*	*	*	*	*	*
5	*****		*****		*****	*****		*****		*****	*	*	*	*****	*	*	*	*	*	*
4	*****		*****		*****	*****		*****		*****	*	*	*	*****	*	*	*	*	*	*
3	*****		*****		*****	*****		*****		*****	*	*	*	*****	*	*	*	*	*	*
2	*****		*****		*****	*****		*****		*****	*	*	*	*****	*	*	*	*	*	*
1	*****		*****		*****	*****		*****		*****	*	*	*	*****	*	*	*	*	*	*

Figure A.2.2-2. Effectiveness of Management: Cluster Map for 20 Independent Systems

Table A.2.2-5. Effectiveness of Management: Summary Statistics
for 9 Large Systems (1 of 2)

CODE	NAME	-ALLOWED-RANGE		--ACTUAL-RANGE--					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
MG01	PDPJMGR	0	50	0	0	50	50	50	30.0	24.5	5.5	54.5
MG02	PDPJLEAD	0	50	0	10	30	50	50	29.4	19.8	9.7	49.2
MG03	PDANMGR	0	50	0	0	0	20	40	8.9	15.4	-6.5	24.3
MG04	PDANLEAD	0	50	0	28	40	40	40	31.7	13.2	18.4	44.9
MG05	PDDVMGR	0	50	20	20	40	50	50	36.7	13.2	23.4	49.9
MG06	PDDVLEAD	0	50	20	35	40	50	50	40.0	10.0	30.0	50.0
MG07	DDPJMGR	0	50	0	8	50	50	50	33.9	22.3	11.6	56.2
MG08	DDPJLEAD	0	50	0	25	30	50	50	32.8	16.4	16.4	49.2
MG09	DDANMGR	0	50	0	0	0	15	40	8.9	13.6	-4.8	22.5
MG10	DDANLEAD	0	50	20	28	40	40	40	34.4	7.7	26.8	42.1
MG11	DDVMGR	0	50	20	20	40	50	50	36.7	13.2	23.4	49.9
MG12	DDVLEAD	0	50	20	30	40	45	50	37.8	9.7	28.1	47.5
MG13	IMPJMGR	0	50	0	15	30	50	50	31.1	19.6	11.5	50.8
MG14	IMPJLEAD	0	50	15	25	35	50	50	35.6	13.1	22.5	48.7
MG15	IMANMGR	0	50	0	0	20	20	40	15.0	13.2	1.8	28.2
MG16	IMANLEAD	0	50	20	33	40	40	40	36.1	7.8	28.3	43.9
MG17	IMDVMGR	0	50	10	20	40	40	40	31.1	12.7	18.4	43.8
MG18	IMDVLEAD	0	50	10	25	40	40	40	22.2	10.9	21.3	43.2
MG19	STPJMGR	0	50	30	30	50	50	50	43.3	10.0	33.3	53.3
MG20	STPJLEAD	0	50	20	30	35	50	50	37.2	10.9	26.3	48.2
MG21	STANMGR	0	50	0	0	10	25	30	12.2	13.0	-0.8	25.2
MG22	STANLEAD	0	50	20	28	30	40	40	32.8	7.5	25.2	40.3
MG23	STDVMGR	0	50	0	10	40	40	40	27.8	17.2	10.6	44.9
MG24	STDVLEAD	0	50	0	10	30	40	50	26.7	16.6	10.1	43.2
MG25	ATPJMGR	0	50	30	30	50	50	50	43.3	10.0	33.3	53.3
MG26	ATPJLEAD	0	50	20	30	35	50	50	37.2	10.9	26.3	48.2
MG27	ATANMGR	0	50	0	5	20	30	30	16.7	12.2	4.4	28.9
MG28	ATANLEAD	0	50	30	30	40	40	40	35.6	5.3	30.3	40.8
MG29	ATDVMGR	0	50	0	10	40	40	40	27.8	17.2	10.6	44.9
MG30	ATDVLEAD	0	50	0	5	30	40	50	24.4	18.1	6.3	42.5
MG31	SBPJMGR	0	50	0	10	30	50	50	30.0	20.0	10.0	50.0
MG32	SBPJLEAD	0	50	10	30	50	50	50	41.1	15.4	25.7	56.5
MG33	SBANMGR	0	50	0	5	20	50	50	25.6	20.7	4.9	46.2
MG34	SBANLEAD	0	50	0	5	20	45	50	23.3	19.4	4.0	42.7
MG35	SBOTHER	0	50	0	8	20	23	25	16.1	9.6	6.5	25.7
MG81	PRELMD	0	300	60	120	195	230	240	176.7	64.3	112.4	240.9
MG82	DETAILED	0	300	90	143	210	213	230	184.4	47.7	136.8	232.1
MG83	IMPLEMENT	0	300	130	140	200	218	225	181.1	39.4	141.8	220.5
MG84	SYSTEM	0	300	100	135	200	218	220	180.0	46.4	133.6	226.4
MG85	ACCEPT	0	300	100	135	210	220	230	185.0	49.5	135.5	234.5
MG86	STABILITY	0	250	90	100	130	178	190	136.1	38.0	98.1	174.1
MG87	PROJMGR	0	250	60	118	200	250	250	181.7	71.2	110.5	252.8
MG88	PROJLEAD	0	250	75	110	175	240	250	172.2	65.3	106.9	237.5
MG89	ANLYSMGR	0	250	0	10	80	93	120	61.7	43.7	17.9	105.4
MG90	ANLYSLED	0	250	130	155	180	183	200	170.6	21.0	149.6	191.5
MG91	DEVMGR	0	250	40	80	140	180	180	128.9	55.8	73.1	184.7

Table A.2.2-5. Effectiveness of Management: Summary Statistics for
9 Large Systems (2 of 2)

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
MG92	DEVLEAD	0	250	50	125	180	200	220	161.1	54.2	106.9	215.3
MG93	TOTAL	0	1750	735	795	1160	1195	1310	1043.3	215.5	827.8	1258.8

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	PRCO									
NUMBER OF CLUSTERS	0	0	0	1	0	0	0	0	0	0
	1	6	7	0	5	2	4	3	9	
	0	1	3	0	0	0	0	0	0	
	0	0	0	0	0	0	0	0	0	
9	*	*	*	*	*	*	*	*	*	*
8	*	*****	*	*	*	*	*	*	*	*
7	*	*****	*	*	*	*	*	*	*	*
6	*****	*****	*	*	*	*	*	*	*	*
5	*****	*****	*	*****	*	*	*	*	*	*
4	*****	*****	*****	*****	*****	*****	*	*	*	*
3	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
2	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****

Figure A.2.2-3. Effectiveness of Management: Cluster Map for 9 Large Systems

Table A.2.2-6. Effectiveness of Management: Summary Statistics
for 11 Small Systems (1 of 2)

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
MG01	PDPJMG	0	50	30	50	50	50	50	48.2	6.0	42.2	54.2
MG02	PDPJLEAD	0	50	20	30	35	50	50	37.7	10.8	26.9	48.5
MG03	PDANMGR	0	50	0	0	0	10	20	4.5	8.2	-3.7	12.7
MG04	PDANLEAD	0	50	30	30	30	40	40	34.5	5.2	29.3	39.8
MG05	PDDVMGR	0	50	20	40	40	40	50	39.1	7.0	32.1	46.1
MG06	PDDVLEAD	0	50	20	40	40	40	50	39.1	7.0	32.1	46.1
MG07	DDPJMG	0	50	30	50	50	50	50	47.3	6.5	40.8	53.7
MG08	DDPJLEAD	0	50	20	30	35	50	50	36.8	10.1	26.8	46.9
MG09	DDANMGR	0	50	0	10	10	10	20	10.0	6.3	3.7	16.3
MG10	DDANLEAD	0	50	20	35	35	40	40	35.5	5.7	29.8	41.1
MG11	DDVVMGR	0	50	20	40	40	40	50	39.1	7.0	32.1	46.1
MG12	DDDVLEAD	0	50	20	40	40	40	50	39.1	7.0	32.1	46.1
MG13	IMPJMG	0	50	20	50	50	50	50	46.4	9.2	37.1	55.6
MG14	IMPJLEAD	0	50	20	30	35	50	50	36.8	10.1	26.8	46.9
MG15	IMANMGR	0	50	15	20	20	20	20	19.5	1.5	18.0	21.1
MG16	IMANLEAD	0	50	20	40	40	40	40	38.2	6.0	32.2	44.2
MG17	IMDVMGR	0	50	20	40	40	40	50	38.2	7.5	30.7	45.7
MG18	IMDVLEAD	0	50	20	40	40	40	50	39.1	7.0	32.1	46.1
MG19	STPJMG	0	50	40	50	50	50	50	49.1	3.0	46.1	52.1
MG20	STPJLEAD	0	50	20	30	35	50	50	36.8	10.1	26.8	46.9
MG21	STANMGR	0	50	20	20	20	20	40	22.7	6.5	16.3	29.2
MG22	STANLEAD	0	50	30	40	40	40	40	39.1	3.0	36.1	42.1
MG23	STDVMGR	0	50	0	30	30	40	50	29.1	13.8	15.3	42.8
MG24	STDVLEAD	0	50	0	30	30	40	50	30.0	12.6	17.4	42.6
MG25	ATPJMG	0	50	40	50	50	50	50	49.1	3.0	46.1	52.1
MG26	ATPJLEAD	0	50	20	30	35	50	50	36.8	10.1	26.8	46.9
MG27	ATANMGR	0	50	20	20	20	30	40	23.6	6.7	16.9	30.4
MG28	ATANLEAD	0	50	40	40	40	40	40	40.0	0.0	40.0	40.0
MG29	ATDVMGR	0	50	10	30	30	40	50	30.0	11.8	18.2	41.8
MG30	ATDVLEAD	0	50	10	30	30	40	50	30.0	11.8	18.2	41.8
MG31	SBPJMG	0	50	30	50	50	50	50	48.2	6.0	42.2	54.2
MG32	SBPJLEAD	0	50	50	50	50	50	50	50.0	0.0	50.0	50.0
MG33	SBANMGR	0	50	10	20	30	30	50	30.0	11.8	18.2	41.8
MG34	SBANLEAD	0	50	0	10	10	20	50	18.2	16.6	1.6	34.8
MG35	SBOTHR	0	50	10	20	25	25	35	24.5	6.9	17.7	31.4
MG81	PRELMD	0	300	190	190	190	210	240	203.2	17.9	185.3	221.1
MG82	DETAILD	0	300	180	200	205	225	240	207.7	16.8	190.9	224.5
MG83	IMPLMENT	0	300	180	195	220	240	260	218.2	24.9	193.3	243.1
MG84	SYSTEM	0	300	140	200	200	220	280	206.8	34.9	171.9	241.8
MG85	ACCEPT	0	300	160	200	200	220	280	209.5	30.4	179.2	239.9
MG86	STABILTY	0	250	130	160	165	165	235	170.9	34.5	136.4	205.4
MG87	PROJMG	0	250	210	220	250	250	250	240.0	17.3	222.7	257.3
MG88	PROJLEAD	0	250	100	150	175	250	250	185.0	50.7	134.3	235.7
MG89	ANLYSMGR	0	250	70	70	70	100	100	80.5	13.5	67.0	94.0
MG90	ANLYSLED	0	250	150	185	185	200	200	187.3	14.4	172.9	201.7
MG91	DEVMG	0	250	50	140	140	160	200	137.3	37.4	99.8	174.7

Table A.2.2-6. Effectiveness of Management: Summary Statistics
for 11 Small Systems (2 of 2).

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
MG92	DEVLEAD	0	250	70	180	180	200	250	177.3	43.1	134.1	220.4
MG93	TOTAL	0	1750	1085	1130	1180	1280	1460	1216.4	109.8	1106.5	1326.2

NUMBER OF CLUSTERS	PRCO											
	0	0	0	0	0	0	1	0	0	0	0	0
	6	6	7	7	7	7	1	7	7	7	8	8
	2	3	1	4	5	7	0	2	6	8	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
11	*	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*****	*	*	*	*	*	*	*	*	*
9	*	*	*****	*****	*	*	*	*	*	*	*	*
8	*	*	*****	*****	*****	*	*	*	*	*	*	*
7	*	*	*****	*****	*****	*****	*	*****	*	*	*	*
6	*	*	*****	*****	*****	*****	*****	*****	*	*	*	*
5	*	*	*****	*****	*****	*****	*****	*****	*****	*	*	*
4	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*	*
3	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*
2	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****

Figure A.2.2-4. Effectiveness of Management: Cluster Map
for 11 Small Systems

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A.2.3 PERFORMANCE OF TEAM

- <u>X</u> -	Objective	- <u>X</u> -	Subjective
- - -	Absolute	- <u>X</u> -	Relative
- - -	Explicit	- <u>X</u> -	Derived
- <u>X</u> -	Static	- - -	Dynamic
- <u>X</u> -	Predictive	- - -	Explanatory

This category measures on-the-job performance of the development team, who are a part of the development environment. These measures are derived from objective data. They are subjective in the sense that the performance of each team member is combined to form a team value. They are static and predictive because they are computed from data available before the design, implementation, and testing phases. They are dynamic and explanatory in the sense that the values for each phase can be updated to be more accurate as each phase is completed, since the composition of the development team may have changed during a phase. Codes ending in 1, 5, 8, and 9 are unique; the others are derived. The overall measures are derived from the phase measures.

The remainder of this subsection contains tables and figures that describe the Performance of Team measures with brief phrases, raw numbers, simple statistics, and graphics. These tables and figures include

- Descriptions of the measures with code numbers, mnemonic names, acceptable values, and brief phrases (Table A.2.3-1)
- Values of the measures for 25 systems (Table A.2.3-2), where large values indicate better on-the-job performance
- Summary statistics for 11 projects (Table A.2.3-3)
- Cluster map for 11 projects (Figure A.2.3-1)

- Summary statistics for 20 independent systems (Table A.2.3-4)
- Cluster map for 20 independent systems (Figure A.2.3-2)
- Summary statistics for 9 large systems (Table A.2.3-5)
- Cluster map for 9 large systems (Figure A.2.3-3)
- Summary statistics for 11 small systems (Table A.2.3-6)
- Cluster map for 11 small systems (Figure A.2.3-4)

Table A.2.3-1. Performance of Team: Description of Measures (1 of 3)

Code	Measure	Range		Description
		Low	High	
Design				
PF01	DPROG	003	300	Programmers
				Technical Staff
PF02	DTSPROJ	017	309	Programmers and Project Managers
PF03	DTSANALY	024	314	Programmers, Project Managers, and Analysis Managers
PF04	DTSDEVEL	024	314	Programmers and Development Managers
Development Management				
PF05	DDMPROJ	074	346	Project
PF06	DDMANALY	074	346	Project and Analysis
PF07	DDMDEVEL	074	346	Development
Interface Management				
PF08	DIMANALY	074	346	Analysis
PF09	DIMDEVEL	074	346	Development
PF10	D	000	000	Not Defined
Implementation				
PF11	IPROG	003	300	Programmers
				Technical Staff
PF12	ITSPROJ	017	309	Programmers and Project Managers
PF13	ITSANALY	024	314	Programmers, Project Managers, and Analysis Managers
PF14	ITSDEVEL	024	314	Programmers and Development Managers
Development Management				
PF15	IDMPROJ	074	346	Project
PF16	IDMANALY	074	346	Project and Analysis
PF17	IDMDEVEL	074	346	Development

Table A.2.3-1. Performance of Team: Description of Measures (2 of 3)

Code	Measure	Range		Description
		Low	High	
Implementation (Continued)				
Interface Management				
PF18	IIMANALY	074	346	Analysis
PF19	IIMDEVEL	074	346	Development
PF20	I	000	000	Not Defined
Test				
PF21	TPROG	003	300	Programmers
Technical Staff				
PF22	TTSPROJ	017	309	Programmers and Project Managers
PF23	TTSANALY	024	314	Programmers, Project Managers, and Analysis Managers
PF24	TTSDEVEL	024	314	Programmers and Development Managers
Development Management				
PF25	TDMPROJ	074	346	Project
PF26	TDMANALY	074	346	Project and Analysis
PF27	TDMDEVEL	074	346	Development
Interface Management				
PF28	TIMANALY	074	346	Analysis
PF29	TIMDEVEL	074	346	Development
PF30	T	000	000	Not Defined
Overall				
PF31	OPROG	003	300	Programmers
Technical Staff				
PF32	OTSPROJ	017	309	Programmers and Project Managers
PF33	OTSANALY	024	314	Programmers, Project Managers, and Analysis Managers

Table A.2.3-1. Performance of Team: Description of Measures (3 of 3)

Code	Measure	Range		Description
		Low	High	
Overall (Continued)				
PF34	OTSDEVEL	024	314	Technical Staff (Continued) Programmers and Development Managers
Development Management				
PF35	ODMPROJ	074	346	Project
PF36	ODMANALY	074	346	Project and Analysis
PF37	ODMDEVEL	074	346	Development
Interface Management				
PF38	OIMANALY	074	346	Analysis
PF39	OIMDEVEL	074	346	Development
PF40	O	000	000	Not Defined

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Table A.2.3-2. Performance of Team: Values of the Measures
for 25 Systems (1 of 2)

PRCO	PF01	PF02	PF03	PF04	PF05	PF06	PF07	PF08	PF09
0100	84	110	122	114	215	211	188	204	132
0200	75	99	110	117	193	192	215	192	260
0300	70	87	94	98	158	151	163	137	174
0400	74	97	107	106	191	184	180	170	156
0500	100	117	126	136	188	186	222	183	290
0600	99	122	131	129	212	204	197	190	168
0700	61	85	113	126	185	178	219	166	288
0800	170	182	182	175	227	209	187	172	106
0900	84	100	109	108	162	165	161	172	160
1000	100	122	129	130	209	197	200	172	183
1100	76	92	102	114	159	162	204	167	294
9000	95	112	120	122	182	179	184	172	188
0610	95	119	128	126	212	204	197	190	168
0620	110	127	131	128	173	182	171	201	168
0630	112	133	148	139	221	233	202	257	164
0631	129	151	164	157	241	247	222	257	184
0632	65	84	103	93	160	192	160	257	160
0710	55	72	83	95	139	148	188	166	288
0720	125	133	137	149	165	165	206	166	288
0730	47	65	77	89	137	147	188	166	288
0740	56	73	84	96	139	148	188	166	288
0750	64	84	94	108	165	164	210	162	300
0760	45	62	74	87	133	144	185	166	288
0770	45	62	74	87	133	144	185	166	288
0780	59	80	92	105	164	167	211	174	305

PRCO	PF11	PF12	PF13	PF14	PF15	PF16	PF17	PF18	PF19
0300	93	120	131	124	227	219	196	205	136
0200	81	108	122	128	217	217	240	216	285
0300	73	92	99	103	167	159	174	143	187
0400	77	98	108	107	183	180	177	174	166
0500	96	117	125	136	199	194	229	183	290
0600	124	146	154	152	235	223	217	199	181
0700	97	121	127	140	213	197	240	164	295
0800	151	168	174	164	238	227	195	206	108
0900	93	97	108	104	114	145	131	206	167
1000	93	100	111	109	129	155	148	206	186
1100	90	93	100	114	105	123	171	161	303
9000	93	98	109	109	120	147	146	202	198
0610	117	141	149	147	235	223	217	199	181
0620	139	152	160	157	204	210	197	221	184
0630	98	122	133	128	218	216	200	211	163
0631	109	135	124	122	238	229	220	211	184
0632	75	92	105	100	159	177	159	211	159
0710	95	110	117	130	172	170	213	164	295
0720	166	173	172	185	198	187	230	164	295
0730	95	112	119	132	181	175	219	164	295
0740	70	88	98	111	161	162	206	164	295
0750	65	86	97	110	170	172	215	174	305
0760	90	109	116	129	185	178	221	164	295
0770	108	120	126	139	171	169	212	164	295
0780	73	97	107	120	192	187	229	179	303

Table A.2.3-2. Performance of Team: Values of the Measures for 25 Systems (2 of 2)

PRCO	PF21	PF22	PF23	PF24	PF25	PF26	PF27	PF28	PF29
0100	124	154	162	158	273	252	236	209	161
0200	95	119	128	138	215	205	240	184	238
0300	78	98	107	110	176	175	184	174	201
0400	97	117	126	124	198	195	188	188	169
0500	101	123	130	142	211	199	237	175	288
0600	111	137	146	144	240	226	221	200	184
0700	98	124	132	145	228	210	254	174	305
0800	153	168	171	165	229	214	192	184	116
0900	80	107	119	118	218	211	206	197	182
1000	94	117	127	127	209	205	205	196	198
1100	80	97	106	119	161	166	209	174	305
9000	91	114	124	126	206	202	208	194	212
0610	119	143	151	150	240	227	221	200	184
0620	118	133	141	139	192	195	190	200	184
0630	94	117	128	124	212	209	195	202	160
0631	105	130	140	137	231	221	213	202	178
0632	72	89	102	97	156	171	156	202	156
0710	88	106	114	128	177	176	220	174	305
0720	186	192	191	204	214	201	245	174	305
0730	92	111	120	133	189	184	227	174	305
0740	66	86	97	110	168	170	214	174	305
0750	72	92	102	115	172	173	215	175	302
0760	186	192	191	204	214	201	245	174	305
0770	103	118	125	138	181	179	222	174	305
0780	74	97	108	120	191	187	228	179	302

PRCO	PF31	PF32	PF33	PF34	PF35	PF36	PF37	PF38	PF39
0100	100	128	138	132	238	228	206	206	143
0200	84	108	120	128	208	205	232	197	278
0300	74	92	100	104	167	162	174	151	187
0400	82	104	114	112	191	186	182	177	164
0500	99	119	127	138	200	193	229	181	289
0600	112	135	144	142	229	218	212	196	177
0700	85	110	124	137	209	195	238	168	296
0800	158	173	176	168	231	217	191	187	110
0900	86	101	112	110	164	174	166	192	170
1000	96	113	122	122	182	185	184	192	189
1100	82	94	103	116	142	150	195	167	301
9000	93	108	118	119	169	176	179	189	199
0610	111	134	143	141	229	218	212	196	177
0620	122	137	144	141	190	196	186	207	179
0630	101	124	136	130	217	219	199	223	162
0631	114	139	143	139	237	232	218	223	182
0632	70	88	103	97	158	180	158	223	158
0710	79	96	105	118	163	165	207	168	296
0720	159	166	167	179	192	184	227	168	296
0730	78	96	105	118	169	169	211	168	296
0740	64	82	93	106	156	160	203	168	296
0750	67	87	98	111	169	169	213	170	302
0760	107	121	127	140	177	174	217	168	296
0770	85	100	109	121	161	164	206	168	296
0780	69	91	102	115	182	180	222	177	303

Table A.2.3-3. Performance of Team: Summary Statistics for 11 Projects

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
PF01	DPROG	3	300	61	74	84	100	170	90.3	29.4	60.8	119.7
PF02	DTSPROJ	17	309	85	92	100	122	182	110.3	27.2	83.1	137.5
PF03	DTSANALY	24	314	94	107	113	129	182	120.5	23.5	97.0	144.0
PF04	DTSDEVEL	24	314	98	108	117	130	175	123.0	20.7	102.3	143.7
PF05	DDMPROJ	74	346	158	162	191	212	227	190.8	23.7	167.1	214.6
PF06	DDMANALY	74	346	151	165	186	204	211	185.4	19.9	165.5	205.2
PF07	DDMDEVEL	74	346	161	180	197	215	222	194.2	20.8	173.4	215.0
PF08	DIMANALY	74	346	137	167	172	190	204	175.0	17.5	157.5	192.5
PF09	DIMDEVEL	74	346	106	156	174	288	294	201.0	68.7	132.3	269.7
PF11	IPROG	3	300	73	81	93	97	151	97.1	22.3	74.8	119.4
PF12	ITSPROJ	17	309	92	97	108	121	168	114.5	23.9	90.6	138.5
PF13	ITSANALY	24	314	99	108	122	131	174	123.5	23.1	100.4	146.7
PF14	ITSDEVEL	24	314	103	107	124	140	164	125.5	20.6	105.0	146.1
PF15	IDMPROJ	74	346	105	129	199	227	238	184.3	49.0	135.3	233.2
PF16	IDMANALY	74	346	123	155	194	219	227	185.4	35.6	149.8	220.9
PF17	IDMDEVEL	74	346	131	171	195	229	240	192.5	36.4	156.1	229.0
PF18	IIMANALY	74	346	143	164	199	206	216	187.5	23.9	163.6	211.5
PF19	IIMDEVEL	74	346	108	166	186	290	303	209.5	70.4	139.1	279.8
PF21	TPROG	3	300	78	80	97	111	153	101.0	22.0	79.0	123.0
PF22	TTSPROJ	17	309	97	107	119	137	168	123.7	22.0	101.8	145.7
PF23	TTSANALY	24	314	106	119	128	146	171	132.2	20.4	111.8	152.6
PF24	TTSDEVEL	24	314	110	119	138	145	165	135.5	17.4	118.1	152.8
PF25	TDMPROJ	74	346	161	198	215	229	273	214.4	30.2	184.1	244.6
PF26	TDMANALY	74	346	166	195	205	214	252	205.3	23.1	182.1	228.4
PF27	TDMDEVEL	74	346	184	192	209	237	254	215.6	23.5	192.1	239.2
PF28	TIMANALY	74	346	174	174	184	197	209	186.8	12.3	174.6	199.1
PF29	TIMDEVEL	74	346	116	169	198	288	305	217.9	66.4	151.5	284.3
PF31	OPROG	3	300	74	82	86	100	158	96.2	23.2	73.0	119.3
PF32	OTSPROJ	17	309	92	101	110	128	173	116.1	23.0	93.1	139.1
PF33	OTSANALY	24	314	100	112	122	138	176	125.5	21.4	104.1	146.8
PF34	OTSDEVEL	24	314	104	112	128	138	168	128.1	18.2	109.8	146.3
PF35	ODMPROJ	74	346	142	167	200	229	238	196.5	30.7	165.8	227.1
PF36	ODMANALY	74	346	150	174	193	217	228	192.1	24.2	167.9	216.3
PF37	ODMDEVEL	74	346	166	182	195	229	238	200.8	24.5	176.3	225.3
PF38	OIMANALY	74	346	151	168	187	196	206	183.1	16.2	166.9	199.3
PF39	OIMDEVEL	74	346	110	164	187	289	301	209.5	68.4	141.0	277.9

NUMBER OF CLUSTERS	PRCD										
	0	0	0	0	0	0	1	0	0	0	1
	1	6	8	2	5	7	1	3	4	9	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
11	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*	*	*	*	*	*	*	*
9	*	*	*	*	*	*	*	*	*	*	*
8	*	*	*	*	*	*	*	*	*	*	*
7	*	*	*	*	*	*	*	*	*	*	*
6	*	*	*	*	*	*	*	*	*	*	*
5	*	*	*	*	*	*	*	*	*	*	*
4	*	*	*	*	*	*	*	*	*	*	*
3	*	*	*	*	*	*	*	*	*	*	*
2	*	*	*	*	*	*	*	*	*	*	*
1	*	*	*	*	*	*	*	*	*	*	*

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Figure A.2.3-1. Performance of Team: Cluster Map for 11 Projects

Table A.2.3-4. Performance of Team: Summary Statistics for 20 Independent Systems

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
PF01	DPROG	3	300	45	57	76	100	170	82.3	31.3	51.0	113.6
PF02	DTSPROJ	17	309	62	75	98	121	182	100.8	30.2	70.6	131.0
PF03	DTSANALY	24	314	74	86	108	129	182	110.1	28.0	82.2	138.1
PF04	DTSDEVEL	24	314	87	97	111	130	175	115.3	22.8	92.6	138.1
PF05	DDMPROJ	74	346	133	144	165	205	227	174.1	31.0	143.1	205.2
PF06	DDMANALY	74	346	144	149	166	196	233	175.1	26.1	149.0	201.3
PF07	DDMDEVEL	74	346	161	185	188	206	222	192.5	16.6	176.0	209.1
PF08	DIMANALY	74	346	137	166	171	188	257	177.4	24.0	153.5	201.4
PF09	DIMDEVEL	74	346	106	165	274	288	305	229.4	69.6	159.8	299.0
PF11	IPROG	3	300	65	78	93	106	166	98.1	26.8	71.3	125.0
PF12	ITSPROJ	17	309	86	97	110	122	173	115.1	25.3	89.8	140.5
PF13	ITSANALY	24	314	97	107	118	133	174	123.6	23.6	100.0	147.2
PF14	ITSDEVEL	24	314	103	110	128	138	185	128.8	21.6	107.3	150.4
PF15	IDMPROJ	74	346	105	168	184	214	238	183.3	37.0	146.3	220.3
PF16	IDMANALY	74	346	123	164	179	215	227	183.4	28.5	154.9	211.9
PF17	IDMDEVEL	74	346	131	182	209	221	240	201.0	28.5	172.5	229.5
PF18	IIMANALY	74	346	143	164	177	206	221	183.4	23.0	160.4	206.4
PF19	IIMDEVEL	74	346	108	171	288	295	305	236.7	69.6	167.1	306.3
PF21	TPROG	3	300	66	80	95	119	186	105.0	34.5	70.5	139.5
PF22	TTSPROJ	17	309	86	100	117	141	192	124.3	30.9	93.5	155.2
PF23	TTSANALY	24	314	97	110	127	149	191	132.2	27.7	104.5	159.9
PF24	TTSDEVEL	24	314	110	119	131	148	204	138.3	27.0	111.3	165.3
PF25	TDMPROJ	74	346	161	178	204	215	273	202.0	27.2	174.8	229.2
PF25	TDMANALY	74	346	166	177	197	208	252	196.2	21.1	175.1	217.3
PF27	TDMDEVEL	74	346	184	198	218	234	245	215.9	19.5	196.5	235.4
PF28	TIMANALY	74	346	174	174	177	197	209	184.0	12.1	172.0	196.1
PF29	TIMDEVEL	74	346	116	183	288	305	305	243.5	67.9	175.6	311.4
PF31	OPROG	3	300	64	78	86	106	159	95.1	26.5	68.7	121.6
PF32	OTSPROJ	17	309	82	95	106	127	173	113.3	24.9	88.4	138.2
PF33	OTSANALY	24	314	93	104	117	138	176	122.0	22.9	99.2	144.9
PF34	OTSDEVEL	24	314	104	113	122	140	179	127.5	19.6	107.9	147.1
PF35	ODMPROJ	74	346	142	165	182	206	238	186.4	27.0	159.4	213.4
PF36	ODMANALY	74	346	150	166	182	203	228	184.9	22.6	162.3	207.5
PF37	ODMDEVEL	74	346	166	187	206	216	232	203.1	18.4	184.7	221.5
PF38	OIMANALY	74	346	151	168	177	195	223	181.5	17.9	163.7	199.4
PF39	OIMDEVEL	74	346	110	172	284	296	303	236.5	68.9	167.6	305.4

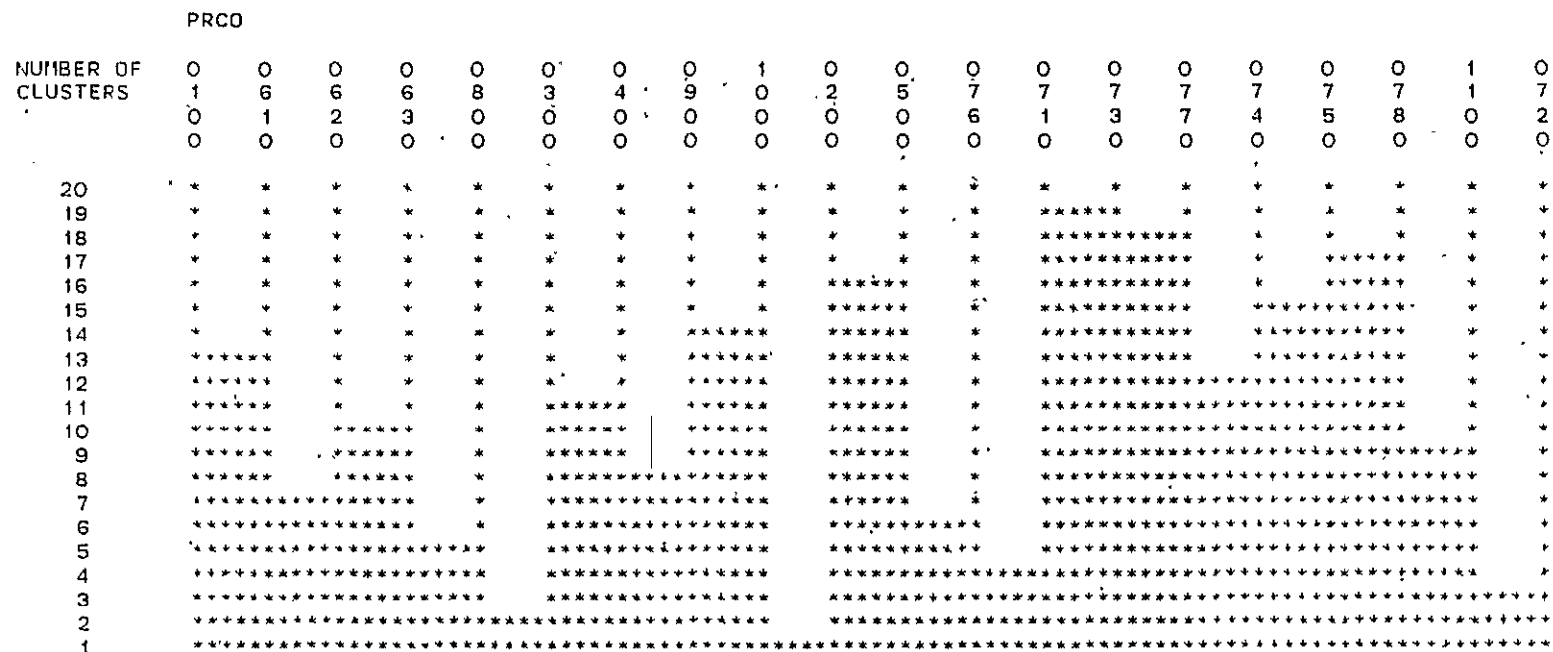


Figure A.2.3-2. Performance of Team: Cluster Map for 20 Independent Systems

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Table A.2.3-5. Performance of Team: Summary Statistics for
9 Large Systems

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
PF01	DPROG	3	300	47	72	84	98	100	81.0	16.9	64.1	97.9
PF02	DTSPROJ	17	309	65	92	100	118	122	101.8	18.1	83.7	119.8
PF03	DTSANALY	24	314	77	101	110	127	129	111.3	17.4	93.9	128.7
PF04	DTSEVEL	24	314	89	102	114	128	136	113.8	15.3	98.5	129.1
PF05	DDMPROJ	74	346	137	160	191	211	215	185.0	27.1	157.9	212.1
PF06	DDMANALY	74	346	147	158	186	201	211	181.9	22.8	159.1	204.7
PF07	DDMDEVEL	74	346	161	172	188	208	222	190.4	20.8	169.6	211.3
PF08	DIMANALY	74	346	137	168	172	191	204	176.2	19.3	156.9	195.5
PF09	DIMDEVEL	74	346	132	158	174	274	290	201.2	60.8	140.4	262.0
PF11	IPROG	3	300	73	79	93	96	117	90.9	13.0	77.9	103.9
PF12	ITSPROJ	17	309	92	98	108	119	141	109.4	15.2	94.2	124.7
PF13	ITSANALY	24	314	99	108	119	128	149	119.1	15.0	104.1	134.1
PF14	ITSEVEL	24	314	103	106	124	134	147	121.1	15.9	105.2	137.1
PF15	IDMPROJ	74	346	114	148	183	222	235	183.6	41.8	141.7	225.4
PF16	IDMANALY	74	346	145	157	180	218	223	185.2	29.6	155.6	214.8
PF17	IDMDEVEL	74	346	131	161	196	224	240	192.3	37.5	154.8	229.8
PF18	IIMANALY	74	346	143	169	199	206	216	188.4	24.1	164.3	212.6
PF19	IIMDEVEL	74	346	136	167	186	288	295	210.3	61.7	148.6	272.0
PF21	TPROG	3	300	78	86	95	110	124	97.8	15.5	82.3	113.2
PF22	TTSPOJ	17	309	98	109	117	133	154	121.0	17.5	103.5	138.5
PF23	TTSANALY	24	314	107	120	127	141	162	130.0	16.7	113.3	146.7
PF24	TTSDEVEL	24	314	110	121	133	146	158	133.3	15.4	118.0	148.7
PF25	TDMPROJ	74	346	176	194	211	229	273	214.3	28.6	185.8	242.9
PF25	TDMANALY	74	346	175	190	205	219	252	205.9	22.9	183.0	228.8
PF27	TDMDEVEL	74	346	184	197	221	237	240	216.0	21.2	194.8	237.2
PF28	TIMANALY	74	346	174	175	188	199	209	188.6	12.8	175.8	201.3
PF29	TIMDEVEL	74	346	161	176	198	288	305	219.6	57.2	162.4	276.7
PF31	OPROG	3	300	74	80	86	100	111	90.0	12.1	77.9	102.1
PF32	OTSPROJ	17	309	92	99	108	124	134	110.6	14.3	96.3	124.8
PF33	OTSANALY	24	314	100	109	120	133	143	120.1	14.3	105.8	134.4
PF34	OTSDEVEL	24	314	104	111	122	135	141	122.8	12.9	109.9	135.7
PF35	ODMPROJ	74	346	164	168	191	219	238	194.2	26.9	167.3	221.1
PF36	ODMANALY	74	346	162	172	186	212	228	191.1	22.3	168.8	213.4
PF37	ODMDEVEL	74	346	166	178	206	221	232	199.6	23.9	175.6	223.5
PF38	OIMANALY	74	346	151	173	192	197	206	184.4	17.1	167.4	201.5
PF39	OIMDEVEL	74	346	143	167	187	284	296	210.3	59.7	150.6	270.0

	PRCO									
NUMBER OF	0	0	0	0	0	1	0	0	0	
CLUSTERS	1	6	3	4	9	0	2	5	7	
	0	1	0	0	0	0	0	0	3	
	0	0	0	0	0	0	0	0	0	
9	*	*	*	*	*	*	*	*	*	*
8	*	*	*	*	*	*	*	*	*	*
7	*	*	*	*	*	*	*	*	*	*
6	*****	*	*	*	*****	*****	*****	*****	*	*
5	*****	*****	*****	*****	*****	*****	*****	*****	*	*
4	*****	*****	*****	*****	*****	*****	*****	*****	*****	*
3	*****	*****	*****	*****	*****	*****	*****	*****	*****	*
2	*****	*****	*****	*****	*****	*****	*****	*****	*****	*
1	*****	*****	*****	*****	*****	*****	*****	*****	*****	*

Figure A.2.3-3. Performance of Team: Cluster Map
for 9 Large Systems

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Table A.2.3-6. Performance of Team: Summary Statistics
for 11 Small Systems

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
PFO1	DPROG	3	300	45	55	64	112	170	83.4	40.4	43.0	123.7
PFO2	DTSPROJ	17	309	62	72	84	133	182	100.0	38.4	61.6	138.4
PFO3	DTSANALY	24	314	74	83	94	137	182	109.2	35.3	73.9	144.4
PFO4	DTSDEVEL	24	314	87	95	108	139	175	116.6	28.2	88.4	144.8
PFO5	DDMPROJ	74	346	133	139	164	173	227	165.3	32.4	132.9	197.6
PFO6	DDMANALY	74	346	144	148	164	182	233	169.6	28.4	141.2	198.1
PFO7	DDMDEVEL	74	346	171	185	188	206	211	194.3	12.9	181.4	207.2
PFO8	DIMANALY	74	346	162	166	166	174	257	178.5	28.1	150.3	206.6
PFO9	DIMDEVEL	74	346	106	168	288	294	305	252.5	70.3	182.1	322.8
PF11	IPROG	3	300	65	73	95	139	166	104.1	33.8	70.3	137.9
PF12	ITSPROJ	17	309	86	93	110	152	173	119.8	31.3	88.5	151.1
PF13	ITSANALY	24	314	97	100	117	160	174	127.3	29.1	98.2	156.3
PF14	ITSDEVEL	24	314	110	114	129	157	185	135.2	24.1	111.1	159.3
PF15	IDMPROJ	74	346	105	170	185	204	238	183.1	34.6	148.4	217.7
PF16	IDMANALY	74	346	123	169	178	210	227	181.9	28.9	153.1	210.8
PF17	IDMDEVEL	74	346	171	197	212	221	230	208.1	17.1	191.0	225.2
PF18	IIMANALY	74	346	161	164	164	206	221	179.3	22.3	156.9	201.6
PF19	IIMDEVEL	74	346	108	184	295	303	305	258.3	70.8	187.5	329.1
PF21	TPROG	3	300	66	74	94	153	186	110.9	44.5	66.4	155.4
PF22	TTSPOJ	17	309	86	97	117	168	192	127.1	39.4	87.7	166.5
PF23	TTSANALY	24	314	97	106	125	171	191	134.0	35.1	98.9	169.1
PF24	TTSDEVEL	24	314	110	119	128	165	204	142.4	34.0	108.4	176.3
PF25	TDMPROJ	74	346	161	172	191	214	229	191.9	22.4	169.5	214.3
PF25	TDMANALY	74	346	166	173	187	201	214	188.3	16.6	171.7	204.9
PF27	TDMDEVEL	74	346	190	195	215	228	245	215.9	19.0	196.9	234.9
PF28	TIMANALY	74	346	174	174	174	184	202	180.4	10.7	169.7	191.0
PF29	TIMDEVEL	74	346	116	184	305	305	305	263.1	72.2	190.9	335.3
PF31	OPROG	3	300	64	69	85	122	159	99.4	34.2	65.1	133.6
PF32	OTSPROJ	17	309	82	91	100	137	173	115.5	31.7	83.9	147.2
PF33	OTSANALY	24	314	93	102	109	144	176	123.6	28.7	94.9	152.4
PF34	OTSDEVEL	24	314	106	115	121	141	179	131.4	23.7	107.6	155.1
PF35	ODMPROJ	74	346	142	161	177	192	231	180.0	26.5	153.5	206.5
PF36	ODMANALY	74	346	150	164	174	196	219	179.8	22.6	157.2	202.4
PF37	ODMDEVEL	74	346	186	195	206	217	227	206.0	12.9	193.1	218.9
PF38	OIMANALY	74	346	167	168	168	187	223	179.2	19.0	160.2	198.2
PF39	OIMDEVEL	74	346	110	179	296	301	303	257.9	71.0	186.9	328.9

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	PRCO										
NUMBER OF CLUSTERS	0	0	0	0	0	0	0	0	1	0	0
	6	6	8	7	7	7	7	7	1	7	7
	2	3	0	1	7	4	5	8	0	2	6
	0	0	0	0	0	0	0	0	0	0	0
11	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*	*	*	*	*	*	*	*
9	*	*	*	*	*	*	*	*	*	*	*
8	*	*	*	*	*	*	*	*	*	*	*
7	*	*	*	*	*	*	*	*	*	*	*
6	*	*	*	*	*	*	*	*	*	*	*
5	*	*	*	*	*	*	*	*	*	*	*
4	*	*	*	*	*	*	*	*	*	*	*
3	*	*	*	*	*	*	*	*	*	*	*
2	*	*	*	*	*	*	*	*	*	*	*
1	*	*	*	*	*	*	*	*	*	*	*

Figure A.2.3-4. Performance of Team: Cluster Map for 11 Small Systems

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A.2.4 ABILITY OF TEAM

<u> X </u>	Objective	<u> X </u>	Subjective
<u> — </u>	Absolute	<u> X </u>	Relative
<u> — </u>	Explicit	<u> X </u>	Derived
<u> X </u>	Static	<u> — </u>	Dynamic
<u> X </u>	Predictive	<u> — </u>	Explanatory

This category comprises weighted sums of the Experience With Application, Effectiveness of Management, and Performance of Team categories.

The remainder of this subsection contains tables and figures that describe the Ability of Team measures with brief phrases, raw numbers, simple statistics, and graphics.

These tables and figures include

- Descriptions of the measures with code numbers, mnemonic names, acceptable values, and brief phrases (Table A.2.4-1)
- Values of the measures for 25 systems (Table A.2.4-2), where large values indicate more development ability
- Summary statistics for 11 projects (Table A.2.4-3)
- Cluster map for 11 projects (Figure A.2.4-1)
- Summary statistics for 20 independent systems (Table A.2.4-4)
- Cluster map for 20 independent systems (Figure A.2.4-2)
- Summary statistics for 9 large systems (Table A.2.4-5)
- Cluster map for 9 large systems (Figure A.2.4-3)
- Summary statistics for 11 small systems (Table A.2.4-6)
- Cluster map for 11 small systems (Figure A.2.4-4)

Table A.2.4-1. Development Team Ability: Description of Measures

Code	Measure	Range		Description
		Low	High	
AB81	PRDABLTY	0006	1800	Sum AP84, MG81, MG82, PF01*600/300
AB82	DPDABLTY	0033	1800	Sum AP84, MG81, MG82, PF02*600/309
AB83	DTDABLTY	0046	1800	Sum AP84, MG81, MG82, PF03*600/314
AB84	PRIABLTY	0006	1800	Sum AP84, MG83*2, PF11*600/300
AB85	DPIABLTY	0033	1800	Sum AP84, MG83*2, PF12*600/309
AB86	DTIABLTY	0046	1800	Sum AP84, MG83*2, PF13*600/314
AB87	PRTABLTY	0006	1800	Sum AP84, MG84, MG85, PF21*600/300
AB88	DPTABLTY	0033	1800	Sum AP84, MG84, MG85, PF22*600/309
AB89	DTTABLTY	0046	1800	Sum AP84, MG84, MG85, PF23*600/314
AB90	PROABLTY	0006	1800	Sum AP84, MG93*600/1750, PF31*600/300
AB91	DPOABLTY	0033	1800	Sum AP84, MG93*600/1750, PF32*600/309
AB92	DTOABLTY	0046	1800	Sum AP84, MG93*600/1750, PF33*600/314

Table A.2.4-2. Development Team Ability: Values of the
Measures for 25 Systems

FRCD	AB81	AB82	AB83	AB84	AB85	AB86	AB87	AB88	AB89	AB90	AB91	AB92
0100	828	873	893	876	923	940	953	1004	1014	854	899	918
0200	650	692	710	622	670	693	590	631	644	625	663	686
0300	515	544	555	651	683	694	751	785	799	627	655	670
0400	533	573	589	604	640	656	604	637	651	604	639	658
0500	990	1017	1031	962	997	1009	972	1009	1018	973	1003	1018
0600	868	907	920	888	923	934	862	906	919	857	891	908
0700	762	805	856	879	920	928	841	886	897	813	853	880
0800	1090	1103	1098	1092	1116	1122	1136	1156	1157	1082	1097	1103
0900	738	764	778	636	638	656	630	678	697	670	691	712
1000	875	912	921	811	819	837	853	892	908	818	842	859
1100	717	743	760	725	725	736	785	813	827	733	749	766
9000	815	842	854	726	730	748	752	791	807	752	772	791
0610	870	911	924	884	924	935	888	927	938	865	899	916
0620	900	926	930	918	935	946	836	858	869	870	887	901
0630	824	858	883	786	827	844	718	757	774	801	836	859
0631	898	933	953	858	902	877	790	832	847	867	905	913
0632	760	793	827	780	808	831	774	803	825	778	806	835
0710	705	735	754	830	853	863	776	806	818	759	785	802
0720	965	973	977	1092	1096	1089	1092	1092	1085	1033	1032	1034
0730	689	721	742	830	857	867	784	815	829	756	783	800
0740	667	697	715	740	771	787	692	727	745	689	718	739
0750	643	678	695	690	727	745	664	698	715	655	687	708
0760	755	785	806	890	921	932	1042	1042	1035	879	896	908
0770	685	715	736	856	873	881	806	829	839	771	792	809
0780	668	705	726	736	778	794	738	778	796	727	763	784

Table A.2.4-3. Development Team Ability: Summary Statistics for 11 Projects

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
AB81	PRDABLT	6	1800	515	650	762	875	1090	778.7	177.0	601.7	955.8
AB82	DPDABLT	33	1800	544	692	805	912	1103	812.1	173.2	638.9	985.3
AB83	DTDABLT	46	1800	555	710	856	921	1098	828.3	170.0	658.3	998.3
AB84	PRIABLT	6	1800	604	636	811	888	1092	795.1	160.0	635.1	955.1
AB85	DPIABLT	33	1800	638	670	819	923	1116	823.1	163.1	660.0	986.1
AB86	DTIABLT	46	1800	656	693	837	940	1122	836.8	160.0	676.8	996.8
AB87	PRTABLT	6	1800	590	630	841	953	1136	816.1	168.9	647.1	985.0
AB88	DPTABLT	33	1800	631	678	886	1004	1156	854.3	166.5	687.8	1020.7
AB89	DTTABKT	46	1800	644	697	897	1014	1157	866.5	162.9	703.6	1029.3
AB90	PRDABLT	6	1800	604	627	813	857	1082	786.9	153.2	633.7	940.1
AB91	DPDABLT	33	1800	639	663	842	899	1097	816.5	151.4	665.1	968.0
AB92	DTDABLT	46	1800	658	686	859	918	1103	834.4	148.6	685.8	982.9

	PRCO										
NUMBER OF CLUSTERS	0	0	0	1	0	0	0	0	1	0	0
	1	6	7	0	5	8	2	9	1	3	4
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
11	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*	*	*	*	*	*	*	*
9	*****		*	*	*	*	*****	*	*	*	*
8	*****		*****	*	*	*	*****	*	*	*	*
7	*****		*****	*	*	*	*****	*	*	*	*
6	*****		*****	*	*	*	*****	*	*	*	*
5	*****		*****	*	*	*	*****	*	*	*	*
4	*****		*****	*	*	*	*****	*	*	*	*
3	*****		*****	*	*	*	*****	*	*	*	*
2	*****		*****	*	*	*	*****	*	*	*	*
1	*****		*****	*	*	*	*****	*	*	*	*

Figure A.2.4-1. Development Team Ability: Cluster Map for 11 Projects

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Table A.2.4-4. Development Team Ability: Summary Statistics for 20 Independent Systems

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
AB81	PRDABLT	6	1800	515	667	728	874	1090	765.3	150.0	615.4	915.3
AB82	DPDABLT	33	1800	544	699	754	912	1103	796.3	145.8	650.5	942.0
AB83	DTDABLT	46	1800	555	718	769	923	1098	811.1	141.7	669.4	952.9
AB84	PRIABLT	6	1800	604	699	821	889	1092	811.5	141.2	670.3	952.8
AB85	DPIABLT	33	1800	638	726	840	924	1116	838.6	139.0	699.7	977.6
AB86	DTIABLT	46	1800	656	738	854	939	1122	851.3	134.7	716.6	986.0
AB87	PRTABLT	6	1800	590	699	785	937	1136	815.5	157.7	657.8	973.2
AB88	DPTABLT	33	1800	631	735	814	985	1156	846.7	150.4	696.3	997.1
AB89	DTTABKTY	46	1800	644	752	828	995	1157	857.9	144.6	713.3	1002.5
AB90	PROABLT	6	1800	604	675	765	869	1082	789.5	134.5	655.1	924.0
AB91	DPOABLT	33	1800	639	698	789	898	1097	815.8	129.6	686.2	945.4
AB92	DTOABLT	46	1800	658	719	806	914	1103	832.5	125.8	706.7	958.3

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NUMBER OF CLUSTERS	PRCO																			
	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
	1	7	6	6	0	6	2	7	9	3	4	7	7	7	7	7	1	5	7	8
	0	6	1	2	0	3	0	5	0	0	0	1	3	7	4	8	0	0	2	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
19	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
18	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
17	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
16	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
15	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
14	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
13	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
12	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
11	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
9	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
8	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
7	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
6	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
5	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
4	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
3	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
1	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

Figure A.2.4-2. Development Team Ability: Cluster Map for 20 Independent Systems

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Table A.2.4-5. Development Team Ability: Summary Statistics
for 9 Large Systems

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
AB81	PRDABLT	6	1800	515	592	738	873	990	743.1	161.8	581.3	904.9
AB82	DPDABLT	33	1800	544	633	764	912	1017	778.6	161.8	616.8	940.3
AB83	DTDABLT	46	1800	555	650	778	923	1031	793.7	161.3	632.4	955.0
AB84	PRIABLT	6	1800	604	629	811	880	962	764.0	135.8	628.2	899.8
AB85	DPIABLT	33	1800	638	655	819	924	997	794.6	139.2	655.3	933.8
AB86	DTIABLT	46	1800	656	675	837	938	1009	809.7	137.2	672.4	946.9
AB87	PRTABLT	6	1800	590	617	784	921	972	780.6	147.6	633.0	928.1
AB88	DPTABLT	33	1800	631	658	815	966	1009	819.8	148.7	671.1	968.5
AB89	DTTABKT	46	1800	644	674	829	976	1018	833.1	146.7	686.4	979.8
AB90	PROABLT	6	1800	604	626	756	860	973	754.7	130.7	623.9	885.4
AB91	DPDABLT	33	1800	639	659	783	899	1003	786.0	131.7	654.3	917.7
AB92	DTTABLT	46	1800	658	678	800	917	1018	804.1	130.4	673.7	934.5

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	PRCO								
NUMBER OF CLUSTERS	0	0	1	0	0	0	0	0	0
	1	6	0	7	5	2	9	3	4
	0	1	0	3	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
9	*	*	*	*	*	*	*	*	*
8	*****	*	*	*	*	*	*	*	*
7	*****	*	*	*	*	*****	*	*	*
6	*****	*	*	*	*	*****	*	*	*
5	*****	*	*	*	*	*****	*	*****	*
4	*****	*	*	*	*	*****	*	*****	*
3	*****	*	*	*	*	*****	*	*****	*
2	*****	*	*	*	*	*****	*	*****	*
1	*****	*	*	*	*	*****	*	*****	*

Figure A.2.4-3. Development Team Ability: Cluster Map for 9 Large Systems

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Table A.2.4-6. Development Team Ability: Summary Statistics for
11 Small Systems

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
AB81	PRDABLT	6	1800	643	668	717	900	1090	783.5	144.9	638.7	928.4
AB82	DPDABLT	33	1800	678	705	743	926	1103	810.7	137.5	673.2	948.3
AB83	DTDABLT	46	1800	695	726	760	930	1098	825.5	129.8	695.7	955.2
AB84	PRIABLT	6	1800	690	736	830	918	1092	850.5	139.4	711.1	989.8
AB85	DPIABLT	33	1800	725	771	853	935	1116	874.7	134.2	740.5	1008.9
AB86	DTIABLT	46	1800	736	787	863	946	1122	885.4	128.7	756.7	1014.0
AB87	PRTABLT	6	1800	664	718	785	1042	1136	844.1	166.8	677.3	1010.9
AB88	DPTABLT	33	1800	698	757	813	1042	1156	868.7	155.3	713.5	1024.0
AB89	DTTABLT	46	1800	715	774	827	1035	1157	878.2	146.6	731.6	1024.8
AB90	PRDABLT	6	1800	655	727	771	879	1082	818.1	136.8	681.3	954.9
AB91	DPOABLT	33	1800	687	749	792	896	1097	840.2	128.9	711.3	969.1
AB92	DTOABLT	46	1800	708	766	809	908	1103	855.7	123.1	732.7	978.8

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	PRCO										
NUMBER OF CLUSTERS	0	0	0	0	0	0	0	0	0	1	0
6	7	7	8	6	7	7	7	7	7	1	7
2	6	2	0	3	1	7	4	8	0	0	5
0	0	0	0	0	0	0	0	0	0	0	0
11	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*	*	*	*	*	*	*	*
9	*	*	*	*	*	*	*	*	*	*	*
8	*	*	*	*	*	*	*	*	*	*	*
7	*	*	*	*	*	*	*	*	*	*	*
6	*	*	*	*	*	*	*	*	*	*	*
5	*	*	*	*	*	*	*	*	*	*	*
4	*	*	*	*	*	*	*	*	*	*	*
3	*	*	*	*	*	*	*	*	*	*	*
2	*	*	*	*	*	*	*	*	*	*	*
1	*	*	*	*	*	*	*	*	*	*	*

Figure A.2.4-4. Development Team Ability: Cluster Map for 11 Small Systems

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A.3 DIFFICULTY OF PROJECT CLASS OF MEASURES

The Difficulty of Project class measures the degree of

- Complexity of Problem (CP01 through CP15)
 - Constraints (CP01 through CP05)
 - Communications (CP06 through CP08)
 - Other (CP09 through CP15)
 - Sums (CP81 through CP85)
- Internal Influences on Project (IN01 through IN15)
 - Overtime (IN01 through IN03)
 - Staffing Problems (IN04 through IN07)
 - Project Manager (IN08 through IN10)
 - Other (IN11 through IN15)
 - Sums (IN81 through IN84)
- External Influences on Project (EX01 through EX20)
 - Requirements (EX01 and EX02)
 - Support (EX03 through EX06)
 - Outside Development (EX07 through EX09)
 - Simulator (EX10 through EX12)
 - Analysis Leader (EX13 through EX15)
 - Other (EX16 through EX20)
 - Sums (EX81 through EX87)
- Difficulty of Project
 - Sum (DF81)

A.3.1 COMPLEXITY OF PROBLEM

<input checked="" type="checkbox"/> Objective	<input type="checkbox"/> Subjective
<input type="checkbox"/> Absolute	<input checked="" type="checkbox"/> Relative
<input type="checkbox"/> Explicit	<input checked="" type="checkbox"/> Derived
<input checked="" type="checkbox"/> Static	<input type="checkbox"/> Dynamic
<input checked="" type="checkbox"/> Predictive	<input type="checkbox"/> Explanatory

This category measures the complexity of the development problem. These measures are scaled values derived from objective data. For example, Number of Data Sets in

Processing (CP05) is the total number of data sets divided by 0.5. They are relative and dynamic in the sense that an extreme case could change the scaling of the sample. These measures are well known at the end of design, therefore, their predictive value increases from the beginning of the project and peaks shortly after design, when the measures become static.

The remainder of this subsection contains tables and figures that describe the Complexity of Problem measures with brief phrases, raw numbers, simple statistics, and graphics.

These tables and figures include

- Descriptions of the measures with code numbers, mnemonic names, acceptable values, and brief phrases (Table A.3.1-1)
- Values of the measures for 25 systems (Table A.3.1-2), where large values indicate more complexity
- Summary statistics for 11 projects (Table A.3.1-3)
- Cluster map for 11 projects (Figure A.3.1-1)
- Summary statistics for 20 independent systems (Table A.3.1-4)
- Cluster map for 20 independent systems (Figure A.3.1-2)
- Summary statistics for 9 large systems (Table A.3.1-5)
- Cluster map for 9 large systems (Figure A.3.1-3)
- Summary statistics for 11 small systems (Table A.3.1-6)
- Cluster map for 11 small systems (Figure A.3.1-4)

Table A.3.1-1. Complexity of Problem: Description of Measures

Code	Measure	Range		Description
		Low	High	
				Constraints
CP01	CONMEMRY	00	50	Memory
CP02	CONTIMNG	00	50	Timing
				Processing
CP03	PAMTDATA	00	50	Amount of Data in Step
CP04	PDBSIZE	00	50	Data Base Size
CP05	PNOOFDS	00	50	Number of Data Sets
				Communications
CP06	COMPROGS	00	50	Number of Programs
CP07	COMSUBS	00	50	Number of Subsystems
CP08	COMDSETS	00	50	Number of Data Sets
CP09	OLDCODE	00	50	Use of Old Code
CP10	ALGORITHM	00	50	New Algorithms
CP11	SCHEDULE	00	50	Schedule
CP12		00	00	Not Defined
CP13		00	00	Not Defined
CP14		00	00	Not Defined
CP15		00	00	Not Defined
CP81	CNSTRAIN	000	100	Sum CP01 and CP02
CP82	PROCESNG	000	150	Sum CP03 Through CP05
CP83	COMUNICT	000	150	Sum CP06 Through CP08
CP84	EXTRAS	000	150	Sum CP09 Through CP11
CP85	TOTAL	000	550	Sum CP01 Through CP11

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Table A.3.1-2. Complexity of Problem: Values of the Measures for 25 Systems

PRC0	CP01	CP02	CP03	CP04	CP05	CP06	CP07	CP08	CP09	CP10
0100	10	20	10	20	40	20	25	20	20	30
0200	10	20	10	10	20	10	20	20	25	20
0300	40	10	30	20	30	20	25	25	0	0
0400	40	40	50	30	35	50	40	45	25	10
0500	10	20	10	10	20	10	20	25	50	10
0600	40	10	50	50	50	20	30	50	15	40
0700	20	40	10	30	50	40	30	35	40	20
0800	20	10	10	20	50	10	10	35	0	0
0900	10	40	50	15	20	10	20	20	40	20
1000	10	40	50	15	25	20	20	20	30	10
1100	30	40	50	10	10	10	15	20	15	10
9000	10	40	50	15	20	15	20	20	35	15
0610	50	10	50	45	40	20	30	50	15	30
0620	20	0	0	20	15	10	10	20	0	20
0630	10	0	0	20	10	20	10	15	15	30
0631	10	0	0	20	5	20	5	15	50	10
0632	10	0	0	5	5	20	5	5	0	20
0710	40	40	30	15	5	10	5	10	15	0
0720	10	30	10	15	10	20	10	20	30	0
0730	10	40	30	15	15	20	15	25	50	10
0740	0	10	0	15	15	30	5	20	50	0
0750	0	10	0	15	5	40	5	10	0	10
0760	0	0	0	5	10	10	10	15	50	0
0770	0	0	20	10	10	20	5	20	0	0
0780	30	0	20	10	10	10	5	20	0	0

PRC0	CP11	CP81	CP82	CP83	CP84	CP85
0100	30	30	70	65	80	245
0200	45	30	40	50	90	210
0300	30	50	80	70	30	230
0400	30	80	115	135	65	395
0500	50	30	40	55	110	235
0600	40	50	150	100	95	395
0700	20	60	90	105	80	335
0800	10	30	80	55	10	175
0900	10	50	85	50	70	255
1000	10	50	90	60	50	250
1100	10	70	70	45	35	220
9000	10	50	85	55	60	250
0610	40	60	135	100	85	380
0620	10	20	35	40	30	125
0630	45	10	30	45	90	175
0631	50	10	25	40	110	185
0632	30	10	10	30	50	100
0710	10	80	50	25	25	180
0720	10	40	35	50	40	165
0730	10	50	60	60	70	240
0740	10	10	30	55	60	155
0750	10	10	20	55	20	105
0760	30	0	15	35	80	130
0770	10	0	40	45	10	95
0780	40	30	40	35	40	145

Table A.3.1-3. Complexity of Problem: Summary Statistics for 11 Projects

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
CP01	CONMEMRY	0	50	10	10	20	40	40	21.8	13.3	8.5	35.1
CP02	CONTIMNG	0	50	10	10	20	40	40	26.4	13.6	12.7	40.0
CP03	PAMTDATA	0	50	10	10	30	50	50	30.0	20.0	10.0	50.0
CP04	PDBSIZE	0	50	10	10	20	30	50	20.9	12.0	8.9	32.9
CP05	PNOOFDS	0	50	10	20	30	50	50	31.8	14.2	17.6	46.0
CP06	COMPROGS	0	50	10	10	20	20	50	20.0	13.4	6.6	33.4
CP07	COMSUBS	0	50	10	20	20	30	40	23.2	8.1	15.0	31.3
CP08	COMDSETS	0	50	20	20	25	35	50	28.6	11.0	17.7	39.6
CP09	OLDCODE	0	50	0	15	25	40	50	23.6	16.0	7.7	39.6
CP10	ALGORITHM	0	50	0	10	10	20	40	15.5	12.1	3.3	27.6
CP11	SCHEDULE	0	50	10	10	30	40	50	25.9	15.0	10.9	40.9
CP81	CNSTRAIN	0	100	30	30	50	60	80	48.2	17.2	31.0	65.4
CP82	PROCESNG	0	150	40	70	80	90	150	82.7	31.1	51.6	113.8
CP83	COMUNICT	0	150	45	50	60	100	135	71.8	28.8	43.0	100.7
CP84	EXTRAS	0	150	10	35	70	90	110	65.0	30.7	34.3	95.7
CP85	TOTAL	0	550	175	220	245	335	395	267.7	73.9	193.8	341.6

	PRCD											
NUMBER OF CLUSTERS	0	0	0	0	1	0	1	0	0	0	0	0
	1	2	5	3	1	9	0	8	4	6	7	
	0	0	0	0	0	0	0	0	0	0	0	
	0	0	0	0	0	0	0	0	0	0	0	
11	*	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*	*	*	*	*	*	*	*	*
9	*	*	*	*	*	*	*	*	*	*	*	*
8	*	*	*	*	*	*	*	*	*	*	*	*
7	*	*	*	*	*	*	*	*	*	*	*	*
6	*	*	*	*	*	*	*	*	*	*	*	*
5	*	*	*	*	*	*	*	*	*	*	*	*
4	*	*	*	*	*	*	*	*	*	*	*	*
3	*	*	*	*	*	*	*	*	*	*	*	*
2	*	*	*	*	*	*	*	*	*	*	*	*
1	*	*	*	*	*	*	*	*	*	*	*	*

Figure A.3.1-1. Complexity of Problem: Cluster Map for 11 Projects

Table A.3.1-4. Complexity of Problem: Summary Statistics for 20 Independent Systems

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
CP01	CONMEMRY	0	50	0	10	10	30	50	17.5	15.5	2.0	33.0
CP02	CONTIMNG	0	50	0	3	15	40	40	19.0	16.2	2.8	35.2
CP03	PAMTDATA	0	50	0	3	15	45	50	21.5	19.5	2.0	41.0
CP04	PDBSIZE	0	50	5	10	15	20	45	16.8	8.6	8.1	25.4
CP05	PNOOFDS	0	50	5	10	15	29	50	19.8	12.9	6.8	32.7
CP06	COMPROGS	0	50	10	10	20	20	50	18.5	10.9	7.6	29.4
CP07	COMSUBS	0	50	5	6	13	20	40	15.3	9.7	5.6	24.9
CP08	COMDSETS	0	50	10	20	20	25	50	22.8	10.1	12.7	32.8
CP09	OLDCODE	0	50	0	0	18	38	50	21.5	18.8	2.7	40.3
CP10	ALGORITHM	0	50	0	0	10	20	30	10.5	11.0	-0.5	21.5
CP11	SCHEDULE	0	50	10	10	10	38	50	22.5	15.1	7.4	37.6
CP81	CNSTRAIN	0	100	0	13	30	50	80	36.5	24.6	11.9	61.1
CP82	PROCESNG	0	150	15	35	45	80	135	58.0	32.0	26.0	90.0
CP83	COMUNICT	0	150	25	45	53	60	135	56.5	24.1	32.4	80.6
CP84	EXTRAS	0	150	10	30	55	80	110	54.5	29.5	25.0	84.0
CP85	TOTAL	0	550	95	148	195	244	395	205.5	79.5	126.0	285.0

	PRCD																			
NUMBER OF	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0
CLUSTERS	1	2	5	7	9	0	3	8	7	1	6	7	7	7	6	7	7	7	4	6
	0	0	0	3	0	0	0	0	1	0	2	8	2	4	3	6	5	7	0	1
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
19	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
18	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
17	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
16	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
15	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
14	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
13	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
12	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
11	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
9	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
8	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
7	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
6	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
5	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
4	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
3	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
1	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

Figure A.3.1-2. Complexity of Problem: Cluster Map for 20 Independent Systems

Table A.3.1-5. Complexity of Problem: Summary Statistics for 9 Large Systems

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
CP01	CONMEMRY	0	50	10	10	10	40	50	21.1	16.9	4.2	38.0
CP02	CONTIMNG	0	50	10	15	20	40	40	26.7	13.2	13.4	39.9
CP03	PAM1DATA	0	50	10	10	30	50	50	32.2	18.6	13.7	50.8
CP04	PDBSIZE	0	50	10	13	15	25	45	20.0	11.2	8.8	31.2
CP05	PNOOFDS	0	50	15	20	25	38	40	27.2	9.4	17.8	36.6
CP06	COMPROGS	0	50	10	10	20	20	50	20.0	12.2	7.8	32.2
CP07	COMSUBS	0	50	15	20	20	28	40	23.9	7.4	16.5	31.3
CP08	COMUSETS	0	50	20	20	25	35	50	27.8	11.5	16.3	39.3
CP09	OLDCODE	0	50	0	18	25	45	50	28.3	16.4	11.9	44.7
CP10	ALGORTHM	0	50	0	10	10	25	30	15.6	10.1	5.4	25.7
CP11	SCHEDULE	0	50	10	10	30	43	50	28.3	15.4	12.9	43.7
CP81	CNSTRAIN	0	100	30	30	50	55	80	47.8	16.4	31.4	64.2
CP82	PROCESNG	0	150	40	50	80	103	135	79.4	31.8	47.7	111.2
CP83	COMUNICT	0	150	50	53	60	85	135	71.7	28.2	43.5	99.8
CP84	EXTRAS	0	150	30	58	70	88	110	72.2	23.2	49.0	95.4
CP85	TOTAL	0	550	210	233	245	318	395	271.1	67.4	203.8	338.5

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NUMBER OF CLUSTERS	PRC0									
	0	0	0	0	0	0	1	0	0	
	1	2	5	3	7	9	0	4	6	
	0	0	0	0	3	0	0	0	1	
	0	0	0	0	0	0	0	0	0	
9	*	*	*	*	*	*	*	*	*	*
8	*	*	*	*	*	*	*	*	*	*
7	*	*	*	*	*	*	*	*	*	*
6	*	*	*	*	*	*	*	*	*	*
5	*	*	*	*	*	*	*	*	*	*
4	*	*	*	*	*	*	*	*	*	*
3	*	*	*	*	*	*	*	*	*	*
2	*	*	*	*	*	*	*	*	*	*
1	*	*	*	*	*	*	*	*	*	*

Figure A.3.1-3. Complexity of Problem: Cluster Map
for 9 Large Systems

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Table A.3.1-6. Complexity of Problem: Summary Statistics for
11 Small Systems

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
CP01	CONMEMRY	0	50	0	0	10	30	40	14.5	14.4	0.1	28.9
CP02	CONTIMNG	0	50	0	0	10	30	40	12.7	16.2	-3.5	28.9
CP03	PAMTDATA	0	50	0	0	10	20	50	12.7	16.2	-3.5	28.9
CP04	PDBSIZE	0	50	5	10	15	20	20	14.1	4.9	9.2	19.0
CP05	PNOOFDS	0	50	5	10	10	15	50	13.6	12.5	1.2	26.1
CP06	COMPROGS	0	50	10	10	10	20	40	17.3	10.1	7.2	27.4
CP07	COMSUBS	0	50	5	5	10	10	15	8.2	3.4	4.8	11.6
CP08	COMDSETS	0	50	10	15	20	20	35	18.6	6.7	11.9	25.4
CP09	OLDCODE	0	50	0	0	15	30	50	15.9	19.5	-3.6	35.4
CP10	ALGORTHM	0	50	0	0	0	10	30	6.4	10.3	-3.9	16.6
CP11	SCHEDULE	0	50	10	10	10	30	45	17.7	13.7	4.1	31.4
CP81	CNSTRAIN	0	100	0	10	20	40	80	27.3	26.9	0.4	54.1
CP82	PROCESNG	0	150	15	30	35	50	80	40.5	19.7	20.8	60.1
CP83	COMUNICT	0	150	25	35	45	55	55	44.1	9.7	34.4	53.8
CP84	EXTRAS	0	150	10	20	35	60	90	40.0	26.6	13.4	66.6
CP85	TOTAL	0	550	95	125	155	175	220	151.8	36.6	115.3	188.4

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	PRCO										
NUMBER OF CLUSTERS	0	0	0	0	0	0	0	0	0	1	0
11	6	7	7	7	6	7	7	7	7	1	8
10	2	8	2	4	3	6	5	7	1	0	0
9	0	0	0	0	0	0	0	0	0	0	0
8	*	*	*	*	*	*	*	*	*	*	*
7	*	*	*	*	*	*	*	*	*	*	*
6	*****	*	*	*	*	*	*****	*	*	*	*
5	*****	*****	*	*	*	*	*****	*****	*	*	*
4	*****	*****	*****	*	*	*	*****	*****	*****	*	*
3	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*
2	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****

Figure A.3.1-4. Complexity of Problem: Cluster Map for 11 Small Systems

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A.3.2 INTERNAL INFLUENCES ON PROJECT

- <u>X</u> -	Objective	- <u>X</u> -	Subjective
- - -	Absolute	- <u>X</u> -	Relative
- - -	Explicit	- <u>X</u> -	Derived
- - -	Static	- <u>X</u> -	Dynamic
- - -	Predictive	- <u>X</u> -	Explanatory

This category measures internal influences on the project caused by the development environment. These measures are scaled values derived from objective data. For example, Staffing Turnover Problems (IN05) is the number of development team members for which a replacement had to be obtained times 20. They are static and explanatory because, for the most part, they cannot be fully determined until a project is complete. Typical, average, or trend values, however, can be extracted from the samples for prediction.

The remainder of this subsection contains tables and figures that describe the Internal Influences on Project measures with brief phrases, raw numbers, simple statistics, and graphics. These tables and figures include

- Descriptions of the measures with code numbers, mnemonic names, acceptable values, and brief phrases (Table A.3.2-1)
- Values of the measures for 25 systems (Table A.3.2-2), where large values indicate more adverse influences
- Summary statistics for 11 projects (Table A.3.2-3)
- Cluster map for 11 projects (Figure A.3.2-1)
- Summary statistics for 20 independent systems (Table A.3.2-4)
- Cluster map for 20 independent systems (Figure A.3.2-2)

- Summary statistics for 9 large systems
(Table A.3.2-5)
- Cluster map for 9 large systems (Figure A.3.2-3)
- Summary statistics for 11 small systems
(Table A.3.2-6)
- Cluster map for 11 small systems (Figure A.3.2-4)

Table A.3.2-1. Internal Influences on Project:
Description of Measures

Code	Measure	Range		Description
		Low	High	
				Overtime
IN01	OTWKENDS	00	50	Weekends
IN02	OTNITES	00	50	Nights
IN03	OTEARLY	00	50	Early Phases
				Staffing Problems
IN04	SPDESIGN	00	50	Design
IN05	SPTURNOV	00	50	Turnover
IN06	SPDEPART	00	50	Early Departure (Acceptance Testing)
IN07	SPNEEDS	00	50	Extra Help Needed
				Project Manager
IN08	PMSTART	00	50	At Start
IN09	PMTURNOV	00	50	Turnover
IN10	PMEND	00	50	At End
IN11	ATTITUDE	00	50	Team Attitude
IN12	PLTURNNOV	00	50	Project Leader Turnover
IN13	NOOFLEAD	00	50	Number of Project Managers/Leaders
IN14		00	00	Not Defined
IN15		00	00	Not Defined
IN81	OVERTIME	000	150	Sum IN01 Through IN03
IN82	STAFFPROB	000	200	Sum IN04 Through IN07
IN83	LEADERS	000	250	Sum IN08 Through IN10 and IN12 and IN13
IN84	TOTAL	000	650	Sum IN01 Through IN13

Table A.3.2-2. Internal Influences on Project: Values of the Measures for 25 Systems

PRCO	INO1	INO2	INO3	INO4	INO5	INO6	INO7	INO8	INO9	INO10
0100	30	30	0	0	20	30	10	20	50	30
0200	20	30	0	10	0	20	20	40	50	30
0300	30	30	20	10	20	10	20	40	30	10
0400	20	20	0	50	0	10	10	10	10	30
0500	20	30	20	0	20	0	0	10	0	10
0600	50	50	0	20	40	30	30	10	0	10
0700	30	30	0	0	40	0	0	10	0	10
0800	10	0	0	20	20	10	0	0	0	0
0900	20	30	0	0	0	10	25	10	40	50
1000	20	30	0	10	0	0	5	10	20	20
1100	0	20	0	0	0	0	5	10	20	25
9000	20	30	0	5	0	5	15	10	30	35
0610	50	50	0	20	40	30	0	10	0	10
0620	10	10	0	10	0	0	0	10	0	10
0630	30	30	0	0	0	0	30	10	0	10
0631	30	30	0	0	0	0	10	10	0	10
0632	0	0	0	0	0	0	20	20	0	20
0710	20	30	0	0	20	0	0	10	0	10
0720	30	30	0	0	0	0	0	10	0	10
0730	30	30	0	0	20	0	0	10	0	10
0740	20	20	0	0	0	0	0	10	0	10
0750	10	10	0	0	20	0	0	10	0	10
0760	30	30	0	0	20	0	0	10	0	10
0770	0	0	0	0	20	0	0	10	0	10
0780	0	0	0	0	0	0	20	10	0	10

PRCO	IN11	IN12	IN13	IN81	IN82	IN83	IN84
0100	10	0	30	60	60	130	260
0200	10	0	30	50	50	150	260
0300	10	40	40	80	60	160	310
0400	40	10	40	40	70	100	250
0500	10	0	20	70	20	40	140
0600	30	0	20	100	120	40	290
0700	20	0	20	60	40	40	160
0800	0	0	20	10	50	20	80
0900	20	0	40	50	35	140	245
1000	10	30	40	50	15	120	195
1100	0	0	30	20	5	85	110
9000	15	15	40	50	25	130	220
0610	30	0	20	100	90	40	260
0620	10	0	20	20	10	40	80
0630	10	0	40	60	30	60	160
0631	0	0	20	60	10	40	110
0632	10	0	20	0	20	60	90
0710	10	0	20	50	20	40	120
0720	0	0	10	60	0	30	90
0730	0	0	30	60	20	50	130
0740	0	0	20	40	0	40	80
0750	10	0	20	20	20	40	90
0760	0	0	10	60	20	30	110
0770	10	0	20	0	20	40	70
0780	0	0	30	0	20	50	70

Table A.3.2-3. Internal Influences on Project: Summary Statistics for 11 Projects

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
IN01	OTWKENDS	0	50	0	20	20	30	50	22.7	12.7	10.0	35.4
IN02	OTNITES	0	50	0	20	30	30	50	27.3	11.9	15.4	39.2
IN03	OTEARLY	0	50	0	0	0	0	20	3.6	8.1	-4.5	11.7
IN04	SPDESIGN	0	50	0	0	10	20	50	10.9	15.1	-4.2	26.0
IN05	SPTURNOV	0	50	0	0	20	20	40	14.5	15.7	-1.2	30.3
IN06	SPDEPART	0	50	0	0	10	20	30	10.9	11.4	-0.5	22.3
IN07	SPNEEDS	0	50	0	0	10	20	30	11.4	10.7	0.6	22.1
IN08	PMSTART	0	50	0	10	10	20	40	15.5	12.9	2.5	28.4
IN09	PMTURNOV	0	50	0	0	20	40	50	20.0	20.0	0.0	40.0
IN10	PMEND	0	50	0	10	20	30	50	20.5	14.2	6.2	34.7
IN11	ATTITUDE	0	50	0	10	10	20	40	14.5	12.1	2.4	26.7
IN12	PLTURNNOV	0	50	0	0	0	10	40	7.3	14.2	-6.9	21.5
IN13	NOOFLEAD	0	50	20	20	30	40	40	30.0	8.9	21.1	38.9
IN81	OVERTIME	0	150	10	40	50	70	100	53.6	25.4	28.2	79.0
IN82	STAFFPROB	0	200	5	20	50	60	120	47.7	31.5	16.2	79.2
IN83	LEADERS	0	250	20	40	100	140	160	93.2	50.9	42.3	144.1
IN84	TOTAL	0	650	80	140	245	260	310	209.1	76.6	132.4	285.7

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NUMBER OF CLUSTERS	PRCO										
	0	0	0	0	1	0	0	0	0	0	1
	1	2	9	4	0	3	6	5	7	8	1
	0	0	0	0	0	0	0	0	0	0	0
11	*	*	*	*	*	*	*	*	*	*	*
10	*****		*	*	*	*	*	*	*	*	*
9	*****	*	*	*	*	*	*	*****	*	*	*
8	*****			*	*	*	*	*****	*	*	*
7	*****				*	*	*	*****	*	*	*
6	*****				*	*	*	*****	*****		
5	*****					*	*	*****		*****	
4	*****						*	*****			
3	*****							*****			
2	*****							*****			
1	*****							*****			

Figure A.3.2-1. Internal Influences on Project: Cluster Map for 11 Projects

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Table A.3.2-4. Internal Influences on Project: Summary Statistics for
20 Independent Systems

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
IN01	OTWKENDS	0	50	0	10	20	30	50	20.0	12.6	7.4	32.6
IN02	DTNITES	0	50	0	13	30	30	50	23.0	13.0	10.0	36.0
IN03	OTEARLY	0	50	0	0	0	0	20	2.0	6.2	-4.2	8.2
IN04	SPDESIGN	0	50	0	0	0	10	50	6.5	12.3	-5.8	18.8
IN05	SPTURNOV	0	50	0	0	10	20	40	11.0	12.1	-1.1	23.1
IN06	SPDEPART	0	50	0	0	0	10	30	6.0	9.9	-3.9	15.9
IN07	SPNEEDS	0	50	0	0	0	18	30	7.3	10.1	-2.8	17.3
IN08	PMSTART	0	50	0	10	10	10	40	13.0	9.8	3.2	22.8
IN09	PMTURNOV	0	50	0	0	0	20	50	11.0	17.7	-6.7	28.7
IN10	PMEND	0	50	0	10	10	24	50	15.8	11.6	4.1	27.4
IN11	ATTITUDE	0	50	0	0	10	10	40	9.5	10.5	-1.0	20.0
IN12	PLTURNNOV	0	50	0	0	0	0	40	4.0	11.0	-7.0	15.0
IN13	NOOFLEAD	0	50	10	20	25	38	40	26.5	9.9	16.6	36.4
IN81	OVERTIME	0	150	0	20	50	60	100	45.0	26.5	18.5	71.5
IN82	STAFFPROB	0	200	0	16	20	50	90	30.8	24.7	6.1	55.4
IN83	LEADERS	0	250	20	40	45	115	160	70.3	45.6	24.6	115.9
IN84	TOTAL	0	650	70	83	125	249	310	155.5	80.0	75.5	235.5

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NUMBER OF CLUSTERS	PRCO																			
	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
	1	2	9	4	0	3	6	5	7	7	7	6	7	7	1	6	7	7	7	8
	0	0	0	0	0	0	1	0	1	3	6	3	2	4	0	2	5	7	8	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
19	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
18	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
17	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
16	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
15	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
14	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
13	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
12	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
11	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
9	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
8	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
7	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
6	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
5	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
4	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
3	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
1	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

Figure A.3.2-2. Internal Influences on Project: Cluster Map for 20 Independent Systems

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Table A.3.2-5. Internal Influences on Project: Summary
Statistics for 9 Large Systems

CODE	NAME	ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
IN01	OTWKENDS	0	50	20	20	20	30	50	26.7	10.0	16.7	36.7
IN02	OTNITES	0	50	20	30	30	30	50	31.1	7.8	23.3	38.9
IN03	OTEARLY	0	50	0	0	0	10	20	4.4	8.8	-4.4	13.3
IN04	SPDESIGN	0	50	0	0	10	15	50	11.1	16.2	-5.0	27.3
IN05	SPTURNOV	0	50	0	0	20	20	40	13.3	14.1	-0.8	27.5
IN06	SPDEPART	0	50	0	0	10	25	30	12.2	12.0	0.2	24.2
IN07	SPNEEDS	0	50	0	0	10	20	25	10.0	9.7	0.3	19.7
IN08	PMSTART	0	50	10	10	10	30	40	17.8	13.0	4.8	30.8
IN09	PMTURNOV	0	50	0	0	20	45	50	22.2	21.1	1.1	43.3
IN10	PMEND	0	50	10	10	20	30	50	22.2	13.9	8.3	36.2
IN11	ATTITUDE	0	50	0	10	10	25	40	15.6	12.4	3.2	27.9
IN12	PLTURNOV	0	50	0	0	0	20	40	8.9	15.4	-6.5	24.3
IN13	NOOFLEAD	0	50	20	25	30	40	40	32.2	8.3	23.9	40.6
IN81	OVERTIME	0	150	40	50	60	75	100	62.2	18.6	43.7	80.8
IN82	STAFPROB	0	200	15	20	50	65	90	46.7	25.9	20.8	72.5
IN83	LEADERS	0	250	40	45	120	145	160	103.3	48.2	55.1	151.6
IN84	TOTAL	0	650	130	168	250	260	310	227.8	60.2	167.6	288.0

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	PRCO									
NUMBER OF CLUSTERS	0	0	0	0	1	0	0	0	0	0
	1	2	9	4	0	3	6	5	7	
	0	0	0	0	0	0	1	0	3	
	0	0	0	0	0	0	0	0	0	
9	*	*	*	*	*	*	*	*	*	*
8	*	*	*	*	*	*	*	*	*	*
7	*****	*	*	*	*	*	*	*	*	*
6	*****	*	*	*	*	*	*	*	*	*
5	*****	*	*	*	*	*	*	*	*	*
4	*****	*	*	*	*	*	*	*	*	*
3	*****	*	*	*	*	*	*	*	*	*
2	*****	*	*	*	*	*	*	*	*	*
1	*****	*	*	*	*	*	*	*	*	*

Figure A.3.2-3. Internal Influences on Project: Cluster Map for 9 Large Systems

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Table A.3.2-6. Internal Influences on Project: Summary
Statistics for 11 Small Systems

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
INO1	OTWKENDS	0	50	0	0	10	30	30	14.5	12.1	2.4	26.9
INO2	OTNITES	0	50	0	0	20	30	30	16.4	12.9	3.5	29.9
INO3	OTEARLY	0	50	0	0	0	0	0	0.0	0.0	0.0	0.0
INO4	SPDESIGN	0	50	0	0	0	0	20	2.7	6.5	-3.7	9.2
INO5	SPTURNOV	0	50	0	0	0	20	20	9.1	10.4	-1.4	19.5
INO6	SPDEPART	0	50	0	0	0	0	10	0.9	3.0	-2.1	3.9
INO7	SPNEEDS	0	50	0	0	0	5	30	5.0	10.2	-5.2	15.2
INO8	PMSTART	0	50	0	10	10	10	10	9.1	3.0	6.1	12.1
INO9	PMTURNOV	0	50	0	0	0	0	20	1.8	6.0	-4.2	7.8
IN10	PMEND	0	50	0	10	10	10	25	10.5	5.7	4.8	16.1
IN11	ATTITUDE	0	50	0	0	0	10	10	4.5	5.2	-0.7	9.8
IN12	PLTURNNOV	0	50	0	0	0	0	0	0.0	0.0	0.0	0.0
IN13	NOOFLEAD	0	50	10	20	20	30	40	21.8	8.7	13.1	30.6
IN81	OVERTIME	0	150	0	10	20	60	60	30.9	23.9	7.1	54.8
IN82	STAFFPROB	0	200	0	5	20	20	50	17.7	14.4	3.3	32.1
IN83	LEADERS	0	250	20	30	40	50	85	43.2	17.4	25.8	60.5
IN84	TOTAL	0	650	70	80	90	110	160	96.4	26.9	69.4	123.3

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	PRCO										
NUMBER OF CLUSTERS	0	0	0	0	0	0	0	0	0	0	1
	6	7	7	7	8	6	7	7	7	7	1
	2	5	7	8	0	3	1	6	2	4	0
	0	0	0	0	0	0	0	0	0	0	0
11	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*	*	*	*	*	*	*	*
9	*****	*	*	*	*	*	*****	*	*	*	*
8	*****	*	*	*	*	*	*****	*****	*	*	*
7	*****	*****	*	*	*	*	*****	*****	*	*	*
6	*****	*****	*	*	*	*	*****	*****	*	*	*
5	*****	*****	*	*	*	*	*****	*****	*	*	*
4	*****	*****	*	*	*	*	*****	*****	*	*	*
3	*****	*****	*	*	*	*	*****	*****	*	*	*
2	*****	*****	*	*	*	*	*****	*****	*	*	*
1	*****	*****	*	*	*	*	*****	*****	*	*	*

Figure A.3.2-4. Internal Influences on Project: Cluster Map for 11 Small Systems

A.3.3 EXTERNAL INFLUENCES ON PROJECT

<input checked="" type="checkbox"/>	Objective	<input type="checkbox"/>	Subjective
<input type="checkbox"/>	Absolute	<input checked="" type="checkbox"/>	Relative
<input type="checkbox"/>	Explicit	<input checked="" type="checkbox"/>	Derived
<input type="checkbox"/>	Static	<input checked="" type="checkbox"/>	Dynamic
<input type="checkbox"/>	Predictive	<input checked="" type="checkbox"/>	Explanatory

This category measures external influences on the project caused by the development environment. These measures are scaled values derived from objective data. For example, Requirements Changes (EX01) is computed by subtracting 10 from the total number of authorized requirements changes. These measures are static and explanatory because, for the most part, they cannot be fully determined until a project is complete. Typical, average, or trend values, however, can be extracted from the samples for prediction.

The remainder of this subsection contains tables and figures that describe the External Influences on Project measures with brief phrases, raw numbers, simple statistics, and graphics. These tables and figures include

- Descriptions of the measures with code numbers, mnemonic names, acceptable values, and brief phrases (Table A.3.3-1)
- Values of the measures for 25 systems (Table A.3.3-2), where large values indicate more adverse influences
- Summary statistics for 11 projects (Table A.3.3-3)
- Cluster map for 11 projects (Figure A.3.3-1)
- Summary statistics for 20 independent systems (Table A.3.3-4)
- Cluster map for 20 independent systems (Figure A.3.3-2)

- Summary statistics for 9 large systems
(Table A.3.3-5)
- Cluster map for 9 large systems (Figure A.3.3-3)
- Summary statistics for 11 small systems
(Table A.3.3-6)
- Cluster map for 11 small systems (Figure A.3.3-4)

Table A.3.3-1. External Influences on Project: Description of Measures (1 of 2)

Code	Measure	Range		Description
		Low	High	
				Requirements
EX01	REQCHANG	00	50	Changes
EX02	REQCMPLT	00	50	Completeness
				Support
EX03	SANALYS	00	50	Analysis
EX04	SMISPROJ	00	50	Mission Project
EX05	SDEVMGR	00	50	Development Manager
EX06	SDEVLEAD	00	50	Development Leader
				Outside Development
EX07	ODNOSUBS	00	50	Number of Subsystems
EX08	ODFRONTS	00	50	Front-End Processors
EX09	ODONTIME	00	50	On-Time Delivery
				Simulator
EX10	SIMAVAIL	00	50	Availability
EX11	SIMCRECT	00	50	Correctness
EX12	SIMDATA	00	50	Data Support
				Analysis Leader
EX13	ALSTART	00	50	At Start
EX14	ALTURNOV	00	50	Turnover
EX15	ALEND	00	50	At End
EX16	NOOFLEAD	00	50	Number of Analysis Leaders/ Managers
				Support
EX17	SWSUPORT	00	50	Software
EX18	HWSUPORT	00	50	Hardware
EX19		00	00	Not Defined
EX20		00	00	Not Defined
EX81	REQS	000	100	Sum EX01 and EX02
EX82	SUPPORT	000	200	Sum EX03 Through EX06
EX83	OUTSIDEV	000	150	Sum EX07 Through EX09

Table A.3.3-1. External Influences on Project: De-
 scription of Measures (2 of 2)

<u>Code</u>	<u>Measure</u>	<u>Range</u>		<u>Description</u>
		<u>Low</u>	<u>High</u>	
EX84	SIMULATE	000	150	Sum EX10 Through EX12
EX85	LEADERS	000	200	Sum EX13 Through EX16
EX86	SWHWSUP	000	100	Sum EX17 and EX18
EX87	TOTAL	000	900	Sum EX01 Through EX18

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Table A.3.3-2. External Effects on Project: Values of the
Measures for 25 Systems (1 of 2)

PRCD	EX01	EX02	EX03	EX04	EX05	EX06	EX07	EX08	EX09	EX10
0100	20	0	30	20	10	10	40	0	10	20
0200	10	0	0	0	40	0	40	0	20	0
0300	20	0	20	10	20	10	0	0	0	0
0400	50	0	10	0	50	50	20	0	10	0
0500	0	30	0	0	10	0	0	0	0	0
0600	20	50	40	50	30	20	40	50	50	40
0700	40	20	30	50	20	0	0	0	0	40
0800	0	0	40	0	0	0	0	0	0	0
0900	30	10	0	0	30	20	0	0	0	0
1000	35	0	0	0	30	20	0	0	0	0
1100	0	10	0	0	10	0	0	0	0	0
9000	30	5	0	0	30	20	0	0	0	0
0610	10	50	40	50	30	20	40	40	50	40
0620	0	30	40	50	30	20	0	0	0	0
0630	0	40	40	50	30	20	20	20	50	40
0631	0	50	40	50	50	30	20	20	50	40
0632	0	10	40	50	0	0	0	0	0	40
0710	10	30	30	50	20	0	0	0	0	30
0720	0	20	30	50	20	0	0	0	0	40
0730	5	20	30	50	20	0	0	0	0	30
0740	0	0	30	20	20	0	0	0	0	40
0750	0	0	30	20	20	0	0	0	0	50
0760	0	0	30	20	20	0	0	0	0	0
0770	0	0	30	50	20	0	0	0	0	50
0780	0	10	30	50	20	0	0	0	0	0

PRCD	EX11	EX12	EX13	EX14	EX15	EX16	EX17	EX18
0100	20	20	40	0	40	50	0	30
0200	0	10	10	0	10	20	0	30
0300	50	20	30	50	10	20	0	10
0400	0	10	10	10	10	20	20	10
0500	0	10	0	30	0	40	20	10
0600	20	50	40	50	10	30	40	30
0700	50	20	30	40	10	30	20	30
0800	0	0	10	30	10	30	0	10
0900	0	0	10	50	30	50	30	20
1000	0	0	10	50	30	50	30	20
1100	0	0	10	30	10	30	20	20
9000	0	0	10	50	30	50	30	20
0610	20	50	40	50	10	30	40	30
0620	0	0	40	50	10	30	40	30
0630	20	50	10	0	10	10	20	30
0631	20	50	10	0	10	10	20	30
0632	20	50	10	0	10	10	20	30
0710	50	20	30	40	10	30	20	30
0720	50	20	30	40	10	30	20	30
0730	50	20	30	40	10	30	20	30
0740	50	20	30	40	10	30	20	30
0750	50	20	30	40	10	30	20	30
0760	0	0	30	40	10	30	20	30
0770	50	20	30	40	10	30	20	30
0780	0	0	10	0	10	10	20	30

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Table A.3.3-2. External Effects on Project: Values of the
Measures for 25 Systems (2 of 2)

PRCQ	EX81	EX82	EX83	EX84	EX85	EX86	EX87
0100	20	70	50	60	130	30	360
0200	10	40	60	10	40	30	190
0300	20	60	0	70	110	10	270
0400	50	110	30	10	50	30	280
0500	30	10	0	10	70	30	150
0600	70	140	140	110	130	70	660
0700	60	100	0	110	110	50	430
0800	0	40	0	0	80	10	130
0900	40	50	0	0	140	50	280
1000	35	50	0	0	140	50	275
1100	10	10	0	0	80	40	140
9000	35	50	0	0	140	50	275
0610	60	140	130	110	130	70	640
0620	30	140	0	0	130	70	370
0630	40	140	90	110	30	50	460
0631	50	170	90	110	30	50	500
0632	10	90	0	110	30	50	290
0710	40	100	0	100	110	50	400
0720	20	100	0	110	110	50	390
0730	25	100	0	100	110	50	385
0740	0	70	0	110	110	50	340
0750	0	70	0	120	110	50	350
0760	0	70	0	0	110	50	230
0770	0	100	0	120	110	50	380
0780	10	100	0	0	30	50	190

Table A.3.3-3. External Influences on Project: Summary Statistics for 11 Projects

CODE	NAME	-ALLOWED-RANGE-		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
EX01	REQCHANG	0	50	0	0	20	35	50	20.5	17.1	3.4	37.6
EX02	REQCMPLT	0	50	0	0	0	20	50	10.9	16.4	-5.5	27.3
EX03	SANALYS	0	50	0	0	10	30	40	15.5	16.9	-1.5	32.4
EX04	SMISPROJ	0	50	0	0	0	20	50	11.8	19.9	-8.1	31.7
EX05	SDEVLMGR	0	50	0	10	20	30	50	22.7	14.9	7.8	37.6
EX06	SDEVLEAD	0	50	0	0	10	20	50	11.8	15.4	-3.6	27.2
EX07	ODNOSUBS	0	50	0	0	0	40	40	12.7	18.5	-5.8	31.2
EX08	ODFRONTS	0	50	0	0	0	0	50	4.5	15.1	-10.5	19.6
EX09	ODONTIME	0	50	0	0	0	10	50	8.2	15.4	-7.2	23.6
EX10	SIMAVAIL	0	50	0	0	0	20	40	9.1	16.4	-7.3	25.5
EX11	SIMCRECT	0	50	0	0	0	20	50	12.7	20.0	-7.3	32.8
EX23	SIMDATA	0	50	0	0	10	20	50	12.7	14.9	-2.2	27.6
EX13	ALSTART	0	50	0	10	10	30	40	18.2	14.0	4.2	32.2
EX14	ALTURNOV	0	50	0	10	30	50	50	30.9	19.7	11.2	50.6
EX15	ALEND	0	50	0	10	10	30	40	15.5	12.1	3.3	27.6
EX16	NDOFLEAD	0	50	20	20	30	50	50	33.6	12.1	21.6	45.7
EX17	SWSUPORT	0	50	0	0	20	30	40	16.4	14.3	2.0	30.7
EX18	HWSUPORT	0	50	10	10	20	30	30	20.0	8.9	11.1	28.9
EX81	REQS	0	100	0	10	30	50	70	31.4	22.1	9.2	53.5
EX82	SUPPORT	0	200	10	40	50	100	140	61.8	40.7	21.1	102.5
EX83	OUTSIDEV	0	150	0	0	0	50	140	25.5	44.1	-18.7	69.6
EX84	SIMULATE	0	150	0	0	10	70	110	34.5	44.6	-10.0	79.1
EX85	LEADERS	0	200	40	70	110	130	140	98.2	36.0	62.2	134.2
EX86	SWHWSUP	0	100	10	30	30	50	70	36.4	18.0	18.3	54.4
EX87	TOTAL	0	900	130	150	275	360	660	287.7	154.9	132.9	442.6

	PRCO										
NUMBER OF CLUSTERS	0	0	0	0	1	0	0	0	1	0	0
	1	7	2	5	1	8	3	9	0	4	6
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
11	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*	*	*	*	*****	*	*	*
9	*	*	*	*****	*	*	*	*****	*	*	*
8	*	*	*	*****	*	*	*	*****	*	*	*
7	*	*	*	*****	*	*	*	*****	*	*	*
6	*	*	*****	*****	*	*	*	*****	*	*	*
5	*	*	*****	*****	*	*	*	*****	*	*	*
4	*****	*****	*****	*****	*	*	*	*****	*	*	*
3	*****	*****	*****	*****	*****	*****	*****	*****	*	*	*
2	*****	*****	*****	*****	*****	*****	*****	*****	*****	*	*
1	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*

Figure A.3.3-1. External Influences on Project: Cluster Map for 11 Projects

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Table A.3.3-4. External Influences on Project: Summary Statistics for 20 Independent Systems

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
EX01	REQCHANG	0	50	0	0	0	18	50	9.5	14.4	-4.9	23.9
EX02	REQCMPLT	0	50	0	0	5	28	50	12.5	15.9	-3.4	28.4
EX03	SANALYS	0	50	0	3	30	30	40	23.0	15.3	7.7	38.3
EX04	SMISPROJ	0	50	0	0	20	50	50	24.5	22.6	1.9	47.1
EX05	SDEVLMGR	0	50	0	20	20	30	50	22.5	11.2	11.3	33.7
EX06	SDEVLEAD	0	50	0	0	0	20	50	8.5	13.1	-4.6	21.6
EX07	ODNOSUBS	0	50	0	0	0	15	40	8.0	15.1	-7.1	23.1
EX08	ODFRONTS	0	50	0	0	0	0	40	3.0	9.8	-6.8	12.8
EX09	ODONTIME	0	50	0	0	0	8	50	7.0	15.6	-8.6	22.6
EX10	SIMAVAIL	0	50	0	0	0	40	50	17.0	20.3	-3.3	37.3
EX11	SIMCRECT	0	50	0	0	10	50	50	20.5	23.3	-2.8	43.8
EX23	SIMDATA	0	50	0	0	15	20	50	14.5	15.0	-0.5	29.5
EX13	ALSTART	0	50	0	10	30	30	40	22.0	12.8	9.2	34.8
EX14	ALTURN0V	0	50	0	15	40	48	50	31.5	18.7	12.8	50.2
EX15	ALEND	0	50	0	10	10	10	40	13.0	9.2	3.8	22.2
EX16	NOOFLEAD	0	50	10	23	30	30	50	30.0	11.2	18.8	41.2
EX17	SWSUPORT	0	50	0	20	20	20	40	19.0	11.7	7.3	30.7
EX18	HWSUPORT	0	50	10	20	30	30	30	24.5	8.3	16.2	32.8
EX81	REQS	0	100	0	3	20	39	60	22.0	18.3	3.7	40.3
EX82	SUPPORT	0	200	10	50	70	100	140	78.5	39.2	39.3	117.7
EX83	OUTSIDEV	0	150	0	0	0	23	130	18.0	36.6	-18.6	54.6
EX84	SIMULATE	0	150	0	0	35	110	120	52.0	52.3	-0.3	104.3
EX85	LEADERS	0	200	30	73	110	125	140	96.5	35.6	60.9	132.1
EX86	SWHWSUP	0	100	10	30	50	50	70	43.5	16.0	27.5	59.5
EX87	TOTAL	0	900	130	200	310	384	640	310.5	123.9	186.6	434.4

NUMBER OF CLUSTERS	PRCO																			
	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0
	1	7	7	7	7	7	7	6	2	7	5	1	8	3	7	9	0	4	6	6
	0	1	2	3	4	5	7	2	0	8	0	0	0	0	6	0	0	0	1	3
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
19	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
18	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
17	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
16	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
15	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
14	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
13	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
12	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
11	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
9	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
8	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
7	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
6	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
5	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
4	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
3	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
1	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

Figure A.3.3-2. External Influences on Project: Cluster Map for 20 Independent Systems

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Table A.3.3-5. External Influences on Project: Summary Statistics for 9 Large Systems

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
EX01	REQCHANG	0	50	0	8	20	33	50	20.0	16.0	4.0	36.0
EX02	REOCMPLT	0	50	0	0	0	25	50	12.2	17.9	-5.7	30.1
EX03	SANALYS	0	50	0	0	10	30	40	14.4	15.9	-1.5	30.3
EX04	SMISPROJ	0	50	0	0	0	35	50	14.4	21.3	-6.8	35.7
EX05	SDEVLMGR	0	50	10	15	30	35	50	26.7	13.2	13.4	39.9
EX06	SDEVLEAD	0	50	0	0	10	20	50	14.4	15.9	-1.5	30.3
EX07	ODNOSUBS	0	50	0	0	0	40	40	15.6	19.4	-3.9	35.0
EX08	ODFRONTS	0	50	0	0	0	0	40	4.4	13.3	-8.9	17.8
EX09	ODONTIME	0	50	0	0	0	15	50	10.0	16.6	-6.6	26.6
EX10	SIMAVAIL	0	50	0	0	0	25	40	10.0	15.8	-5.8	25.8
EX11	SIMCRECT	0	50	0	0	0	35	50	15.6	21.3	-5.7	36.8
EX23	SIMDATA	0	50	0	5	10	20	50	15.6	15.1	0.5	30.6
EX13	ALSTART	0	50	0	10	10	35	40	20.0	15.0	5.0	35.0
EX14	ALTURNOV	0	50	0	5	40	50	50	31.1	22.0	9.1	53.2
EX15	ALEND	0	50	0	10	10	30	40	16.7	13.2	3.4	29.9
EX16	NDOFLEAD	0	50	20	20	30	50	50	34.4	13.3	21.1	47.8
EX17	SWSUPORT	0	50	0	0	20	30	40	17.8	14.8	3.0	32.6
EX18	HWSUPORT	0	50	10	10	20	30	30	21.1	9.3	11.8	30.4
EX81	REQS	0	100	10	20	30	45	60	32.2	15.8	16.4	48.1
EX82	SUPPORT	0	200	10	45	60	105	140	70.0	40.0	30.0	110.0
EX83	OUTSIDEV	0	150	0	0	0	55	130	30.0	44.4	-14.4	74.4
EX84	SIMULATE	0	150	0	5	10	85	110	41.1	44.3	-3.2	85.4
EX85	LEADERS	0	200	40	60	110	135	140	102.2	39.0	63.2	141.2
EX86	SWHWSUP	0	100	10	30	30	50	70	38.9	17.6	21.3	56.5
EX87	TOTAL	0	900	150	230	280	373	640	314.4	142.1	172.4	456.5

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	PRCO									
NUMBER OF	0	0	0	0	0	0	1	0	0	
CLUSTERS	1	7	2	5	3	9	0	4	6	
	0	3	0	0	0	0	0	0	1	
	0	0	0	0	0	0	0	0	0	
9	*	*	*	*	*	*	*	*	*	*
8	*	*	*	*	*	*	*	*	*	*
7	*	*	*	*	*	*	*	*	*	*
6	*	*	*	*	*	*	*	*	*	*
5	*	*	*	*	*	*	*	*	*	*
4	*	*	*	*	*	*	*	*	*	*
3	*	*	*	*	*	*	*	*	*	*
2	*	*	*	*	*	*	*	*	*	*
1	*	*	*	*	*	*	*	*	*	*

Figure A.3.3-3. External Influences on Project: Cluster Map for 9 Large Systems

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Table A.3.3-6. External Influences on Project: Summary Statistics
for 11 Small Systems

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
EX01	REQCHANG	0	50	0	0	0	0	10	0.9	3.0	-2.1	3.9
EX02	REQCMPLT	0	50	0	0	10	30	40	12.7	14.9	-2.2	27.6
EX03	SANALYS	0	50	0	30	30	40	40	30.0	11.0	19.0	41.0
EX04	SMISPROJ	0	50	0	20	50	50	50	32.7	21.0	11.7	53.7
EX05	SDEVLMGR	0	50	0	20	20	20	30	19.1	8.3	10.8	27.4
EX06	SDEVLEAD	0	50	0	0	0	0	20	3.6	8.1	-4.5	11.7
EX07	ODNOSUBS	0	50	0	0	0	0	20	1.8	6.0	-4.2	7.8
EX08	ODFRONTS	0	50	0	0	0	0	20	1.8	6.0	-4.2	7.8
EX09	ODONTIME	0	50	0	0	0	0	50	4.5	15.1	-10.5	19.6
EX10	SIMAVAIL	0	50	0	0	30	40	50	22.7	22.4	0.3	45.1
EX11	SIMCRECT	0	50	0	0	20	50	50	24.5	25.0	-0.5	49.6
EX23	SIMDATA	0	50	0	0	20	20	50	13.6	15.7	-2.0	29.3
EX13	ALSTART	0	50	10	10	30	30	40	23.6	11.2	12.4	34.8
EX14	ALTURNNOV	0	50	0	30	40	40	50	31.8	16.6	15.2	48.4
EX15	ALEND	0	50	10	10	10	10	10	10.0	0.0	10.0	10.0
EX16	NOOFLEAD	0	50	10	30	30	30	30	26.4	8.1	18.3	34.5
EX17	SWSUPPORT	0	50	0	20	20	20	40	20.0	8.9	11.1	28.9
EX18	HWSUPPORT	0	50	10	30	30	30	30	27.3	6.5	20.8	33.7
EX81	REQS	0	100	0	0	10	30	40	13.6	16.3	-2.7	29.9
EX82	SUPPORT	0	200	10	70	100	100	140	85.5	39.1	46.4	124.5
EX83	OUTSIDEV	0	150	0	0	0	0	90	8.2	27.1	-19.0	35.3
EX84	SIMULATE	0	150	0	0	100	110	120	60.9	58.6	2.4	119.5
EX85	LEADERS	0	200	30	80	110	110	130	91.8	33.7	58.1	125.5
EX86	SWHWSUP	0	100	10	50	50	50	70	47.3	14.2	33.1	61.5
EX87	TOTAL	0	900	130	190	350	390	460	307.3	114.0	193.2	421.3

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	PRCO										
NUMBER OF CLUSTERS	0	0	0	0	0	0	0	0	0	1	0
	6	7	7	7	7	7	6	7	7	1	8
	2	1	2	4	5	7	3	6	8	0	0
	0	0	0	0	0	0	0	0	0	0	0
11	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*	*	*	*	*	*	*	*
9	*	*	*	*	*	*	*	*	*	*	*
8	*	*	*	*	*	*	*	*	*	*	*
7	*	*	*	*	*	*	*	*	*	*	*
6	*	*	*	*	*	*	*	*	*	*	*
5	*	*	*	*	*	*	*	*	*	*	*
4	*	*	*	*	*	*	*	*	*	*	*
3	*	*	*	*	*	*	*	*	*	*	*
2	*	*	*	*	*	*	*	*	*	*	*
1	*	*	*	*	*	*	*	*	*	*	*

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Figure A.3.3-4. External Influences on Project: Cluster Map for 11 Small Systems

A.3.4 DIFFICULTY OF PROJECT

- <u>X</u> -	Objective	- <u>X</u> -	Subjective
- - -	Absolute	- <u>X</u> -	Relative
- - -	Explicit	- <u>X</u> -	Derived
- - -	Static	- <u>X</u> -	Dynamic
- - -	Predictive	- <u>X</u> -	Explanatory

This category comprises the weighted sum of the Complexity of Problem, Internal Influences on Project, and External Influences on Project categories.

The remainder of this subsection contains tables and figures that describe the Difficulty of Project measures with brief phrases, raw numbers, simple statistics, and graphics.

These tables and figures include

- Descriptions of the measures with code numbers, mnemonic names, acceptable values, and brief phrases (Table A.3.4-1)
- Values of the measures for 25 systems (Table A.3.4-2), where large values indicate more difficulty
- Summary statistics for 11 projects (Table A.3.4-3)
- Cluster map for 11 projects (Figure A.3.4-1)
- Summary statistics for 20 independent systems (Table A.3.4-4)
- Cluster map for 20 independent systems (Figure A.3.4-2)
- Summary statistics for 9 large systems (Table A.3.4-5)
- Cluster map for 9 large systems (Figure A.3.4-3)
- Summary statistics for 11 small systems (Table A.3.4-6)
- Cluster map for 11 small systems (Figure A.3.4-4)

24 1000 1000 1000
 1000 1000 1000 1000

Table A.3.4-1. Difficulty of Project: Description of Measures

<u>Code</u>	<u>Measure</u>	<u>Range</u>		<u>Description</u>
		<u>Low</u>	<u>High</u>	
DF81	DIFICLTY	0000	1950	Sum CP85*650/550, IN84, EX87*650/900

Table A.3.4-2. Difficulty of Project: Values of the
Measures for 25 Systems

PRCO	DF81
0100	808
0200	645
0300	776
0400	918
0500	525
0600	1231
0700	865
0800	380
0900	747
1000	688
1100	470
9000	713
0610	1169
0620	494
0630	698
0631	688
0632	417
0710	620
0720	565
0730	690
0740	508
0750	466
0760	429
0770	456
0780	378

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	PRCO										
NUMBER OF CLUSTERS	0	0	0	0	1	0	0	0	1	0	0
	1	3	9	2	0	4	7	5	1	8	6
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
11	*	*	*	*	*	*	*	*	*	*	*
10	*	*****	*	*	*	*	*	*	*	*	*
9	*	*****	*****	*	*	*	*	*	*	*	*
8	*	*****	*****	*****	*****	*	*	*	*	*	*
7	*	*****	*****	*****	*****	*****	*****	*	*	*	*
6	*****	*****	*****	*****	*****	*****	*****	*	*	*	*
5	*****	*****	*****	*****	*****	*****	*****	*	*	*	*
4	*****	*****	*****	*****	*****	*****	*****	*	*	*	*
3	*****	*****	*****	*****	*****	*****	*****	*	*	*	*
2	*****	*****	*****	*****	*****	*****	*****	*	*	*	*
1	*****	*****	*****	*****	*****	*****	*****	*	*	*	*

Figure A.3.4-1. Difficulty of Project: Cluster Map for 11 Projects

Table A.3.4-4. Difficulty of Project: Summary Statistics for 20 Independent Systems

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
DF81	DIFICLTY	0	1950	378	467	593	735	1169	621.5	198.5	423.0	820.0

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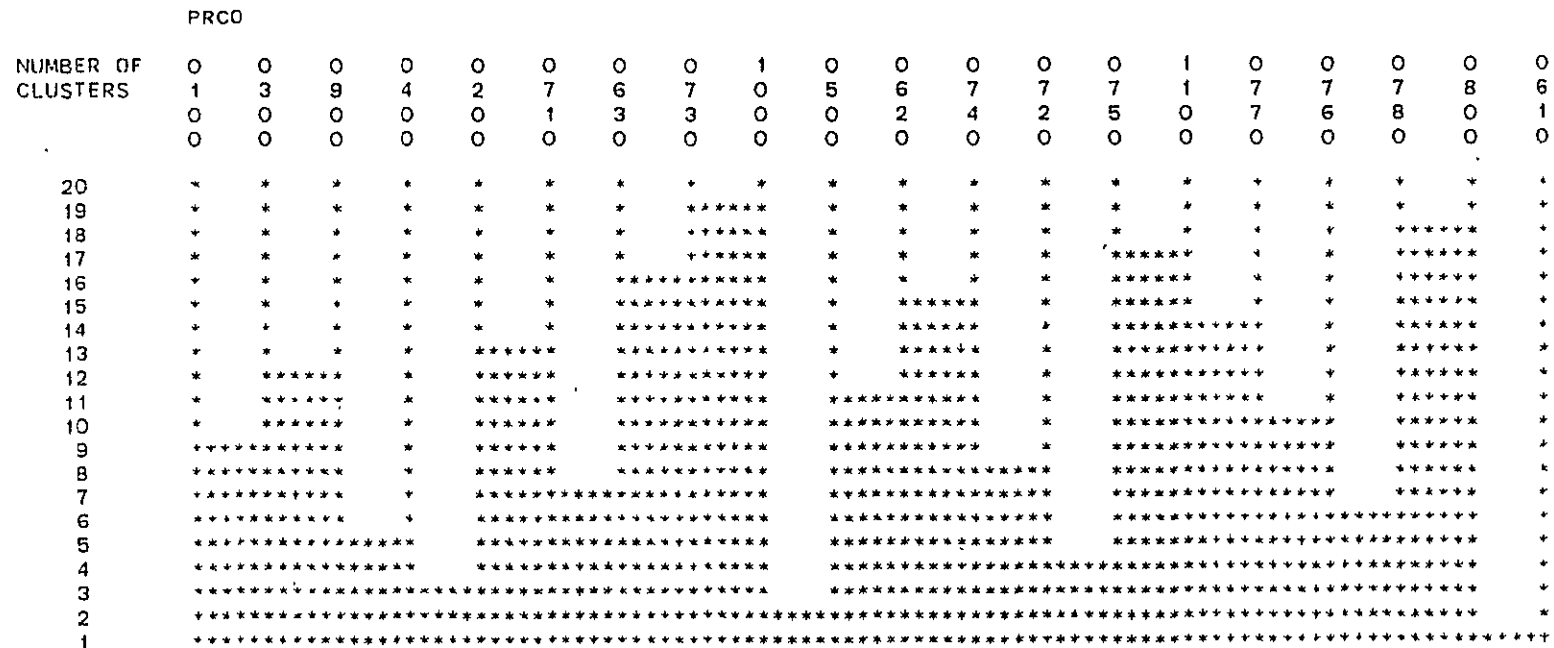


Figure A.3.4-2. Difficulty of Project: Cluster Map for 20 Independent Systems

Table A.3.4-5. Difficulty of Project: Summary Statistics
for 9 Large Systems

CODE	NAME	-ALLOWED-RANGE-		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
DF81	DIFICULTY	0	1950	525	667	747	863	1169	774.0	184.3	589.7	958.3

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NUMBER OF CLUSTERS	PRCO									
	0	0	0	0	0	1	0	0	0	0
	1	3	9	2	7	0	5	4	6	1
	0	0	0	0	3	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	0
9	*	*	*	*	*	*	*	*	*	*
8	*	*	*	*	*	*	*	*	*	*
7	*	*	*	*	*	*	*	*	*	*
6	*	*	*	*	*	*	*	*	*	*
5	*	*	*	*	*	*	*	*	*	*
4	*	*	*	*	*	*	*	*	*	*
3	*	*	*	*	*	*	*	*	*	*
2	*	*	*	*	*	*	*	*	*	*
1	*	*	*	*	*	*	*	*	*	*

Figure A.3.4-3. Difficulty of Project: Cluster Map
for 9 Large Systems

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Table A.3.4-6. Difficulty of Project: Summary Statistics
for 11 Small Systems

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
DFB1	DIFICLTY	0	1950	378	429	470	565	698	496.7	98.0	398.7	594.8

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	PRCO										
NUMBER OF CLUSTERS	0	0	0	1	0	0	0	0	0	0	0
	6	7	7	1	7	7	7	8	6	7	7
	2	4	5	0	7	6	8	0	3	1	2
	0	0	0	0	0	0	0	0	0	0	0
11	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*	*	*	*	*	*	*	*
9	*	*	*	*	*	*	*	*	*	*	*
8	*	*	*	*	*	*	*	*	*	*	*
7	*	*	*	*	*	*	*	*	*	*	*
6	*	*	*	*	*	*	*	*	*	*	*
5	*	*	*	*	*	*	*	*	*	*	*
4	*	*	*	*	*	*	*	*	*	*	*
3	*	*	*	*	*	*	*	*	*	*	*
2	*	*	*	*	*	*	*	*	*	*	*
1	*	*	*	*	*	*	*	*	*	*	*

Figure A.3.4-4. Difficulty of Project: Cluster Map for 11 Small Systems

A.4 PROCESS AND PRODUCT CHARACTERISTICS CLASS OF MEASURES

The Process and Product Characteristics class measures the quality or degree of

- Resources Available (RA01 through RA20)
 - Development Process Support (RA01 through RA03)
 - Support Software (RA04 through RA06)
 - Computer Support (RA07 through RA15)
 - Personnel (RA16 through RA20)
 - Sums (RA81 through RA85)
- Software Product (PR01 through PR20)
 - Size (PR04 through PR07)
 - Completeness (PR10 through PR12)
 - Meet Requirements (PR13 and PR14)
 - Other
 - Sums (PR81 through PR84)
- Product/Process Performance (PP01 through PP15)
 - Product (PP01 through PP06)
 - Process (PP07 through PP15)
 - Sums (PP81 through PP83)

A.4.1 RESOURCES AVAILABLE

<input checked="" type="checkbox"/> Objective	<input type="checkbox"/> Subjective
<input type="checkbox"/> Absolute	<input checked="" type="checkbox"/> Relative
<input type="checkbox"/> Explicit	<input checked="" type="checkbox"/> Derived
<input checked="" type="checkbox"/> Static	<input type="checkbox"/> Dynamic
<input checked="" type="checkbox"/> Predictive	<input type="checkbox"/> Explanatory

This category measures the degree to which resources are available in the development environment. These measures are scaled values derived from objective data. For example, TSO Computer Support (RA11) indicates the quantity number of TSO terminals available per programmer times 100. For the most part, they are static and predictive since most of the information for these measures is known early in the project.

However, demands to complete a project are dynamic; therefore, the measures may change during the project. The samples in this category illustrate the changing environment (excluding the development team); therefore, the trend values are predictive.

The remainder of this subsection contains tables and figures that describe the Resources Available measures with brief phrases, raw numbers, simple statistics, and graphics.

These tables and figures include

- Descriptions of the measures with code numbers, mnemonic names, acceptable values, and brief phrases (Table A.4.1-1)
- Values of the measures for 25 systems (Table A.4.1-2), where large values indicate a higher degree of availability
- Summary statistics for 11 projects (Table A.4.1-3)
- Cluster map for 11 projects (Figure A.4.1-1)
- Summary statistics for 20 independent systems (Table A.4.1-4)
- Cluster map for 20 independent systems (Figure A.4.1-2)
- Summary statistics for 9 large systems (Table A.4.1-5)
- Cluster map for 9 large systems (Figure A.4.1-3)
- Summary statistics for 11 small systems (Table A.4.1-6)
- Cluster map for 11 small systems (Figure A.4.1-4)

Table A.4.1-1. Resources Available: Description of Measures

Code	Measure	Range		Description
		Low	High	
				Development Process Support
RA01	PFORTRAN	00	50	Formal Training
RA02	PINFTRAN	00	50	Informal Training
RA03	PDOCUMEN	00	50	Documentation
				Support Software
RA04	SSINSTRC	00	50	Instruction
RA05	SSMAINT	00	50	Maintenance
RA06	SSSIMLAT	00	50	Simulator
				Computer Support
RA07	CS75	00	50	IBM S/360-75
RA08	CS95	00	50	IBM S/360-95
RA09	CSOTHERM	00	50	Other Model
RA10	CSRJP	00	50	RJP
RA11	CSTSO	00	50	Timesharing Option (TSO)
RA12	CSOPS	00	50	Online Processing System (OPS)
RA13	CSSPACE	00	50	Space
RA14	CSGRPHXD	00	50	Graphic Device
RA15		00	00	Not Defined
				Personnel
RA16	PERLIBRA	00	50	Librarian
RA17	PEREXPRT	00	50	Dedicated Expert
RA18	PERVNVTM	00	50	V&V Team
RA19		00	00	Not Defined
RA20		00	00	Not Defined
RA81	DEVPROCS	000	150	Sum RA01 Through RA03
RA82	SUPPORTSW	000	150	Sum RA04 Through RA06
RA83	COMPUTER	000	400	Sum RA07 Through RA14
RA84	PERSONEL	000	150	Sum RA16 Through RA18
RA85	TOTAL	000	850	Sum RA81 Through RA84

Table A.4.1-2. Resources Available: Values of the Measures
for 25 Systems

PRCD	RA01	RA02	RA03	RA04	RA05	RA06	RA07	RA08	RA09	RA10
0100	20	30	10	10	50	30	10	0	0	50
0200	0	0	10	10	50	40	10	0	0	50
0300	0	0	10	10	25	30	20	10	0	50
0400	10	0	10	10	25	40	20	10	0	50
0500	50	30	30	10	25	40	10	0	0	50
0600	50	30	30	20	25	0	30	0	5	25
0700	20	20	30	20	25	30	30	0	0	25
0800	50	20	50	40	25	50	30	0	0	20
0900	10	40	50	40	10	50	50	30	0	20
1000	20	40	50	40	0	50	50	30	0	20
1100	0	40	50	40	10	50	50	30	0	20
9000	15	40	50	40	5	50	50	30	0	20
0610	50	30	30	20	25	0	30	0	0	25
0620	50	10	30	20	25	50	30	0	0	25
0630	30	20	25	20	25	15	30	0	15	25
0631	50	30	30	20	25	0	30	0	0	25
0632	0	0	10	20	25	50	30	0	50	25
0710	0	0	30	20	25	30	30	0	0	25
0720	50	20	30	20	25	30	30	0	0	25
0730	30	20	30	20	25	30	30	0	0	25
0740	0	20	30	20	25	30	30	0	0	25
0750	0	10	30	20	25	30	30	0	0	25
0760	30	20	30	20	25	50	30	0	0	25
0770	30	20	30	20	25	30	30	0	0	25
0780	30	20	30	20	10	50	30	0	0	25

PRCD	RA11	RA12	RA13	RA14	RA16	RA17	RA18	RA81	RA82	RA83	RA84	RA85
0100	10	0	10	15	40	20	0	60	90	95	60	305
0200	10	0	10	15	40	0	0	10	100	95	40	245
0300	15	0	10	0	35	20	0	10	65	105	55	235
0400	15	0	10	0	35	0	0	20	75	105	35	235
0500	15	0	10	0	35	0	0	110	75	85	35	305
0600	20	0	30	15	40	20	0	110	45	125	60	340
0700	20	0	30	0	35	20	0	70	75	105	55	305
0800	30	50	10	0	10	0	10	120	115	140	20	395
0900	50	50	50	0	35	50	50	100	100	250	135	585
1000	50	50	40	0	35	20	50	110	90	240	105	545
1100	50	50	50	0	35	20	40	90	100	250	95	535
9000	50	50	45	0	35	35	50	105	95	245	120	565
0610	20	0	30	15	40	0	0	110	45	120	40	315
0620	20	0	30	0	35	0	0	90	95	105	35	325
0630	20	0	30	15	35	20	0	75	60	135	55	325
0631	20	0	30	0	35	20	0	110	45	105	55	315
0632	20	0	30	50	50	20	0	10	95	205	70	380
0710	20	0	30	0	35	0	0	30	75	105	35	245
0720	20	0	30	0	35	0	0	100	75	105	35	315
0730	20	0	30	0	35	0	0	80	75	105	35	295
0740	20	0	30	0	35	0	0	50	75	105	35	265
0750	20	0	30	0	35	0	0	40	75	105	35	255
0760	20	0	30	0	35	0	0	80	95	105	35	315
0770	20	0	30	0	35	0	0	80	75	105	35	295
0780	20	0	30	0	35	20	0	80	80	105	55	320

Table A.4.1-3. Resources Available: Summary Statistics for 11 Projects

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
RA01	PFORTRAN	0	50	0	0	20	50	50	20.9	20.2	0.7	41.1
RA02	PINFTRAN	0	50	0	0	30	40	40	22.7	16.2	6.5	38.9
RA03	PDOCUMEN	0	50	10	10	30	50	50	30.0	17.9	12.1	47.9
RA04	SSINSTRC	0	50	10	10	20	40	40	22.7	14.2	8.5	36.9
RA05	SSMAINT	0	50	0	10	25	25	50	24.5	15.2	9.3	39.8
RA06	SSSIMLAT	0	50	0	30	40	50	50	37.3	14.9	22.4	52.2
RA07	CS75	0	50	10	10	30	50	50	28.2	16.0	12.2	44.2
RA08	CS95	0	50	0	0	0	30	30	10.0	13.4	-3.4	23.4
RA09	CSOTHERM	0	50	0	0	0	0	5	0.5	1.5	-1.1	2.0
RA10	CSRUP	0	50	20	20	25	50	50	34.5	14.9	19.6	49.5
RA11	CSTSO	0	50	10	15	20	50	50	25.9	16.4	9.5	42.3
RA12	CSOPS	0	50	0	0	0	50	50	18.2	25.2	-7.0	43.4
RA13	CSSPACE	0	50	10	10	10	40	50	23.6	16.9	6.7	40.5
RA14	CSGRPHXD	0	50	0	0	0	15	15	4.1	7.0	-2.9	11.1
RA16	PERLIBRA	0	50	10	35	35	40	40	34.1	8.3	25.8	42.4
RA17	PEREXPRT	0	50	0	0	20	20	50	15.5	15.1	0.4	30.5
RA18	PERVNVMT	0	50	0	0	0	40	50	13.6	21.6	-7.9	35.2
RA81	DEVPROCS	0	150	10	20	90	110	120	73.6	42.7	30.9	116.4
RA82	SUPORTSW	0	150	45	75	90	100	115	84.5	19.8	64.7	104.4
RA83	COMPUTER	0	400	85	95	105	240	250	145.0	67.0	78.0	212.0
RA84	PERSONEL	0	150	20	35	55	95	135	63.2	34.7	28.4	97.9
RA85	TOTAL	0	850	235	245	305	535	585	366.4	130.5	235.9	496.8

	PRCD										
NUMBER OF	0	0	0	0	0	0	0	0	0	1	1
CLUSTERS	1	7	5	6	8	2	3	4	9	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
11	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*	*	*	*****	*	*	*	*
9	*	*	*	*	*	*	*****	*	*****	*	*
8	*	*	*	*	*	*	*****	*	*****	*	*
7	*****	*	*	*	*	*****	*****	*	*****	*	*
6	*****	*	*	*	*	*****	*****	*****	*****	*	*
5	*****	*	*	*	*	*****	*****	*****	*****	*	*
4	*****	*****	*	*	*	*****	*****	*****	*****	*	*
3	*****	*****	*****	*****	*	*****	*****	*****	*****	*	*
2	*****	*****	*****	*****	*****	*****	*****	*****	*****	*	*
1	*****	*****	*****	*****	*****	*****	*****	*****	*****	*	*

Figure A.4.1-1. Resources Available: Cluster Map for 11 Projects

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Table A.4.1-4. Resources Available: Summary Statistics for 20 Independent Systems

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
RA01	PFORTRAN	0	50	0	0	25	45	50	23.0	19.8	3.2	42.8
RA02	PINFTRAN	0	50	0	10	20	30	40	19.5	13.2	6.3	32.7
RA03	PDOCUMEN	0	50	10	26	30	30	50	29.8	13.0	16.7	42.8
RA04	SSINSTRC	0	50	10	13	20	20	40	21.5	10.4	11.1	31.9
RA05	SSMAINT	0	50	0	25	25	25	50	24.0	11.5	12.5	35.5
RA06	SSSIMLAT	0	50	0	30	35	50	50	36.3	13.5	22.8	49.7
RA07	CS75	0	50	10	23	30	30	50	29.0	11.7	17.3	40.7
RA08	CS95	0	50	0	0	0	8	30	5.5	11.0	-5.5	16.5
RA09	CSOTHERM	0	50	0	0	0	0	15	0.8	3.4	-2.6	4.1
RA10	CSRUP	0	50	20	25	25	44	50	30.3	11.9	18.4	42.1
RA11	CSTSO	0	50	10	16	20	20	50	23.3	12.3	11.0	35.5
RA12	CSOPS	0	50	0	0	0	0	50	10.0	20.5	-10.5	30.5
RA13	CSSPACE	0	50	10	10	30	30	50	26.5	12.7	13.8	39.2
RA14	CSGRPHXD	0	50	0	0	0	0	15	3.0	6.2	-3.2	9.2
RA16	PERLIBRA	0	50	10	35	35	35	40	34.5	6.0	28.5	40.5
RA17	PEREXPRT	0	50	0	0	0	20	50	8.5	13.5	-5.0	22.0
RA18	PERVNVMT	0	50	0	0	0	0	50	7.5	17.1	-9.6	24.6
RA81	DEVPROCS	0	150	10	43	80	100	120	72.3	34.7	37.5	107.0
RA82	SUPORTSW	0	150	45	75	75	95	115	81.8	16.3	65.4	98.1
RA83	COMPUTER	0	400	85	105	105	131	250	128.3	52.5	75.7	180.8
RA84	PERSONEL	0	150	20	35	35	55	135	50.5	28.8	21.7	79.3
RA85	TOTAL	0	850	235	258	310	325	585	332.8	103.7	229.1	436.4

	PRCO																			
NUMBER OF CLUSTERS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
	1	5	6	7	7	7	7	7	6	6	2	3	4	7	7	7	8	9	0	1
	0	0	2	6	8	2	3	7	1	3	0	0	0	1	5	4	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
19	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
18	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
17	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
16	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
15	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
14	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
13	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
12	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
11	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
9	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
8	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
7	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
6	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
5	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
4	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
3	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
1	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

Figure A.4.1-2. Resources Available: Cluster Map for 20 Independent Systems

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Table A.4.1-5. Resources Available: Summary Statistics for
9 Large Systems

CODE	NAME	-ALLOWED-RANGE		--ACTUAL-RANGE--					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
RA01	PFORTRAN	0	50	0	5	20	40	50	21.1	19.0	2.1	40.1
RA02	PINFTRAN	0	50	0	0	30	35	40	21.1	16.9	4.2	38.0
RA03	PDOCUMEN	0	50	10	10	30	40	50	25.6	16.7	8.9	42.2
RA04	SSINSTEC	0	50	10	10	10	30	40	18.9	12.7	6.2	31.6
RA05	SSMAINT	0	50	0	18	25	38	50	26.1	16.2	10.0	42.3
RA06	SSSIMLAT	0	50	0	30	40	45	50	34.4	15.1	19.4	49.5
RA07	CS75	0	50	10	10	20	40	50	25.6	15.9	9.7	41.5
RA08	CS95	0	50	0	0	0	20	30	8.9	12.7	-3.8	21.6
RA09	CSOTHERM	0	50	0	0	0	0	0	0.0	0.0	0.0	0.0
RA10	CSRJP	0	50	20	23	50	50	50	37.8	14.6	23.2	52.4
RA11	CSTSD	0	50	10	13	15	35	50	22.8	15.8	6.9	38.6
RA12	CSOPS	0	50	0	0	0	25	50	11.1	22.0	-10.9	33.2
RA13	CSSPACE	0	50	10	10	10	35	50	22.2	15.6	6.6	37.9
RA14	CSGRPIXD	0	50	0	0	0	15	15	5.0	7.5	-2.5	12.5
RA16	PERLIBRA	0	50	35	35	35	40	40	36.7	2.5	34.2	39.2
RA17	PEREXPRT	0	50	0	0	0	20	50	12.2	17.2	-4.9	29.4
RA18	PERVNVTM	0	50	0	0	0	25	50	11.1	22.0	-10.9	33.2
RA81	DEVPROCS	0	150	10	15	80	110	110	67.8	44.1	23.7	111.9
RA82	SUPORTSW	0	150	45	70	75	95	100	79.4	17.8	61.7	97.2
RA83	COMPUTER	0	400	85	95	105	180	250	133.3	64.1	69.3	197.4
RA84	PERSONEL	0	150	35	35	40	83	135	60.0	36.0	24.0	96.0
RA85	TOTAL	0	850	235	240	305	430	585	340.6	131.4	209.1	472.0

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NUMBER OF CLUSTERS	PRCD								
	0	0	0	0	0	0	0	0	1
	1	5	7	6	2	3	4	9	0
	0	0	3	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
9	*	*	*	*	*	*	*	*	*
8	*	*	*	*	*	*	*	*	*
7	*	*	*	*	*	*	*	*	*
6	*	*	*	*	*	*	*	*	*
5	*	*	*	*	*	*	*	*	*
4	*	*	*	*	*	*	*	*	*
3	*	*	*	*	*	*	*	*	*
2	*	*	*	*	*	*	*	*	*
1	*	*	*	*	*	*	*	*	*

Figure A.4.1-3. Resources Available: Cluster Map
for 9 Large Systems

Table A.4.1-6. Resources Available: Summary Statistics
for 11 Small Systems

CODE	NAME	-ALLOWED-RANGE-		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
RA01	PFORTRAN	0	50	0	0	30	50	50	24.5	21.1	3.4	45.7
RA02	PINFTRAN	0	50	0	10	20	20	40	18.2	9.8	8.4	28.0
RA03	PDOCUMEN	0	50	25	30	30	30	50	33.2	8.4	24.7	41.6
RA04	SSINSTRC	0	50	20	20	20	20	40	23.6	8.1	15.5	31.7
RA05	SSMAINT	0	50	10	25	25	25	25	22.3	6.1	16.2	28.3
RA06	SSSIMLAT	0	50	15	30	30	50	50	37.7	12.5	25.2	50.2
RA07	CS75	0	50	30	30	30	30	50	31.8	6.0	25.8	37.8
RA08	CS95	0	50	0	0	0	0	30	2.7	9.0	-6.3	11.8
RA09	CSOTHERM	0	50	0	0	0	0	15	1.4	4.5	-3.2	5.9
RA10	CSRJP	0	50	20	25	25	25	25	24.1	2.0	22.1	26.1
RA11	CSTSD	0	50	20	20	20	20	50	23.6	9.2	14.4	32.9
RA12	CSOPS	0	50	0	0	0	0	50	9.1	20.2	-11.1	29.3
RA13	CSSPACE	0	50	10	30	30	30	50	30.0	8.9	21.1	38.9
RA14	CSGRPHXD	0	50	0	0	0	0	15	1.4	4.5	-3.2	5.9
RA16	PERLIBRA	0	50	10	35	35	35	35	32.7	7.5	25.2	40.3
RA17	PEREXPRT	0	50	0	0	0	20	20	5.5	9.3	-3.9	14.8
RA18	PERVNVMT	0	50	0	0	0	0	40	4.5	12.1	-7.6	16.7
RA81	DEVPROCS	0	150	30	50	80	90	120	75.9	26.5	49.4	102.4
RA82	SUPORTSW	0	150	60	75	75	95	115	83.6	15.7	68.0	99.3
RA83	COMPUTER	0	400	105	105	105	135	250	124.1	43.8	80.3	167.8
RA84	PERSONEL	0	150	20	35	35	55	95	42.7	19.9	22.8	62.6
RA85	TOTAL	0	850	245	265	315	325	535	326.4	80.6	245.7	407.0

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	PRCO									
NUMBER OF CLUSTERS	0	0	0	0	0	0	0	0	0	1
	6	7	7	7	7	6	7	7	7	1
	2	6	8	2	7	3	1	5	4	0
	0	0	0	0	0	0	0	0	0	0
11	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*	*	*	*	*	*	*
9	*****	*	*	*	*	*	*****	*	*	*
8	*****	*	*	*	*	*	*****	*	*	*
7	*****	*	*****	*	*	*	*****	*	*	*
6	*****	*****	*****	*	*	*	*****	*	*	*
5	*****	*****	*****	*	*	*	*****	*	*	*
4	*****	*****	*****	*****	*****	*****	*****	*	*	*
3	*****	*****	*****	*****	*****	*****	*****	*	*	*
2	*****	*****	*****	*****	*****	*****	*****	*****	*	*
1	*****	*****	*****	*****	*****	*****	*****	*****	*****	*

Figure A.4.1-4. Resources Available: Cluster Map
for 11 Small Systems

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A.4.2 SOFTWARE PRODUCT

--	--	Objective	--	<u>X</u>	--	Subjective
--	--	Absolute	--	<u>X</u>	--	Relative
--	--	Explicit	--	<u>X</u>	--	Derived
--	<u>X</u>	Static	--	--	--	Dynamic
--	--	Predictive	--	<u>X</u>	--	Explanatory

This category measures the quality of the development process and the development product. These measures are subjective because quality is judged, although some rescaled objective measures are included. For example, Completeness (PR10 through PR12) indicates the number of major omissions according to the equation, measure value = $50 - 10 \times \text{omissions}$. These measures are static and explanatory in that most cannot be determined until the project is complete. Typical, average, or trend values of the measures can be extracted from the samples for prediction.

The remainder of this subsection contains tables and figures that describe the Software Product measures with brief phrases, raw numbers, simple statistics, and graphics. These tables and figures include

- Descriptions of the measures with code numbers, mnemonic names, acceptable values, and brief phrases (Table A.4.2-1)
- Values of the measures for 25 systems (Table A.4.2-2), where large values indicate a higher quality process or product
- Summary statistics for 11 projects (Table A.4.2-3)
- Cluster map for 11 projects (Figure A.4.2-1)
- Summary statistics for 20 independent systems (Table A.4.2-4)
- Cluster map for 20 independent systems (Figure A.4.2-2)

- Summary statistics for 9 large systems
(Table A.4.2-5)
- Cluster map for 9 large systems (Figure A.4.2-3)
- Summary statistics for 11 small systems
(Table A.4.2-6)
- Cluster map for 11 small systems (Figure A.4.2-4)

Table A.4.2-1. Software Product: Description of Measures

Code	Measure	Range		Description
		Low	High	
PR01	COST	00	50	Cost of Project
PR02	TIMELY	00	50	Timeliness of Completion
PR03	CONFIDNC	00	50	Confidence in Product
				Size
PR04	SIZNEWSW	00	50	New Software
PR05	SIZEXTSW	00	50	Extensively Modified Software
PR06	SIZSLTSW	00	50	Slightly Modified Software
PR07	SIZOLDSW	00	50	Old Software
PR08	READABLE	00	50	Readable
PR09	RELIEDOC	00	50	Reliable Documentation
				Completeness
PR10	CMPLDESG	00	50	Design
PR11	CMPLCODE	00	50	Code
PR12	CMPLTEST	00	50	Testing
				Meet Requirements
PR13	MREQPROS	00	50	Processing
PR14	MREQMEM	00	50	Memory
PR15		00	00	Not Defined
PR16		00	00	Not Defined
PR17		00	00	Not Defined
PR18		00	00	Not Defined
PR19		00	00	Not Defined
PR20		00	00	Not Defined
PR81	SIZESW	000	200	Sum PR04 Through PR07
PR82	COMPLETE	000	150	Sum PR10 Through PR12
PR83	MEETREQS	000	100	Sum PR13 and PR14
PR84	PRODUCT	000	700	Sum PR01 Through PR14

Table A.4.2-2. Software Product: Values of the Measures
for 25 Systems

PRC0	PRO1	PRO2	PRO3	PRO4	PRO5	PRO6	PRO7	PRO8	PRO9	PR10
0100	45	40	40	20	0	30	40	40	40	40
0200	10	30	40	30	10	30	40	40	40	30
0300	25	30	30	20	0	10	50	30	30	20
0400	25	0	10	40	30	40	40	30	0	20
0500	45	50	50	40	0	20	30	40	40	40
0600	40	30	40	40	30	50	50	50	50	40
0700	35	30	30	40	10	30	40	30	40	40
0800	15	40	50	30	50	50	50	50	50	50
0900	0	15	20	20	0	40	40	30	30	10
1000	5	30	30	30	10	40	40	30	50	30
1100	0	30	40	40	40	40	40	30	30	30
9000	0	25	25	30	10	40	40	30	40	20
0610	45	30	40	40	30	50	50	50	50	40
0620	25	30	30	30	30	50	50	40	50	30
0630	15	30	40	40	20	50	50	50	50	40
0631	0	30	50	40	20	50	50	50	50	40
0632	50	30	40	40	50	50	50	40	50	30
0710	35	30	40	40	50	50	50	50	50	40
0720	50	50	50	40	0	40	30	50	50	50
0730	40	30	30	40	0	10	40	30	40	30
0740	5	40	40	30	20	40	50	50	50	40
0750	0	30	30	40	50	50	40	30	40	30
0760	50	20	50	50	20	40	50	30	40	40
0770	5	30	40	50	50	50	50	50	40	30
0780	25	40	40	40	50	50	50	40	40	40

PRC0	PR11	PR12	PR13	PR14	PR81	PR82	PR83	PR84
0100	40	50	50	50	90	130	100	445
0200	50	50	50	50	110	130	100	420
0300	30	20	50	30	80	70	80	315
0400	0	0	30	20	150	20	50	255
0500	50	50	50	50	90	140	100	475
0600	40	30	50	50	170	110	100	490
0700	50	5	40	40	120	95	80	390
0800	50	45	50	40	180	145	90	520
0900	10	0	40	40	100	20	80	235
1000	30	20	40	40	120	80	80	345
1100	30	40	40	40	160	100	80	410
9000	20	15	40	40	120	55	80	305
0610	40	45	50	50	170	125	100	510
0620	30	45	50	50	160	105	100	450
0630	50	40	40	50	160	130	90	465
0631	50	50	50	50	160	140	100	480
0632	40	40	30	50	190	110	80	500
0710	50	40	40	20	190	130	60	485
0720	50	45	50	50	110	145	100	505
0730	30	35	40	50	90	95	90	375
0740	50	45	50	50	140	135	100	460
0750	40	40	30	50	180	110	80	430
0760	50	45	50	50	160	135	100	515
0770	40	45	40	50	200	115	90	480
0780	50	45	40	50	190	135	90	520

Table A.4.2-3. Software Product: Summary Statistics for 11 Projects

CODE	NAME	-ALLOWED-RANGE-		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
PR01	COST	0	50	0	5	25	40	45	22.3	17.4	4.9	39.6
PR02	TIMELY	0	50	0	30	30	40	50	29.5	13.1	16.4	42.7
PR03	CONFIDNC	0	50	10	30	40	40	50	34.5	12.1	22.4	46.7
PR04	SIZNEWSW	0	50	20	20	30	40	40	31.8	8.7	23.1	40.6
PR05	SIZEXTSW	0	50	0	0	10	30	50	16.4	18.0	-1.7	34.4
PR06	SIZSLTSW	0	50	10	30	40	40	50	34.5	12.1	22.4	46.7
PR07	SIZOLDSW	0	50	30	40	40	50	50	41.8	6.0	35.8	47.8
PR08	READABLE	0	50	30	30	30	40	50	36.4	8.1	28.3	44.5
PR09	RELIEDOC	0	50	0	30	40	50	50	36.4	14.3	22.0	50.7
PR10	CMPLDESG	0	50	10	20	30	40	50	31.8	11.7	20.1	43.5
PR11	CMPLCODE	0	50	0	30	40	50	50	34.5	16.9	17.6	51.5
PR12	CMPLTEST	0	50	0	15	30	50	50	28.2	20.3	7.9	48.5
PR13	MREQPROS	0	50	30	40	50	50	50	44.5	6.9	37.7	51.4
PR14	MREQMEM	0	50	20	40	40	50	50	40.9	9.4	31.5	50.3
PR81	SIZESW	0	200	80	90	120	160	180	124.5	35.0	89.5	159.6
PR82	COMPLETE	0	150	20	70	100	130	145	94.5	44.0	50.6	138.5
PR83	MEETREQS	0	100	50	80	80	100	100	85.5	15.1	70.4	100.5
PR84	PRODUCT	0	700	235	315	410	475	520	390.9	94.0	296.9	484.9

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NUMBER OF CLUSTERS	PRCO										
	0	0	0	0	0	0	1	1	0	0	0
	1	5	2	6	8	7	0	1	3	4	9
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
11	*	*	*	*	*	*	*	*	*	*	*
10	*****	*	*	*	*	*	*	*	*	*	*
9	*****	*	*****	*	*	*	*	*	*	*	*
8	*****	*	*****	*****	*****	*****	*	*	*	*	*
7	*****	*****	*****	*****	*****	*****	*	*	*	*	*
6	*****	*****	*****	*****	*****	*****	*	*	*****	*****	*****
5	*****	*****	*****	*****	*****	*****	*****	*	*****	*****	*****
4	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
3	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
2	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****

Figure A.4.2-1. Software Product: Cluster Map for 11 Projects

Table A.4.2-4. Software Product: Summary Statistics for 20 Independent Systems

CODE	NAME	-ALLOWED-RANGE-		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
PRO1	COST	0	50	0	5	25	44	50	23.3	18.1	5.2	41.3
PRO2	TIMELY	0	50	0	30	30	40	50	31.3	11.2	20.0	42.5
PRO3	CONFIDNC	0	50	10	30	40	40	50	37.0	10.3	26.7	47.3
PRO4	SIZNEWSW	0	50	20	30	40	40	50	35.5	8.9	26.6	44.4
PRO5	SIZEXTSW	0	50	0	0	20	48	50	23.0	20.0	3.0	43.0
PRO6	SIZSLTSW	0	50	10	33	40	50	50	39.0	12.9	26.1	51.9
PRO7	SIZOLDSW	0	50	30	40	45	50	50	44.0	6.8	37.2	50.8
PRO8	READABLE	0	50	30	30	40	50	50	39.5	8.9	30.6	48.4
PRO9	RELIEDOC	0	50	0	40	40	50	50	40.5	11.9	28.6	52.4
PR10	CMPLDESG	0	50	10	30	35	40	50	34.0	9.9	24.1	43.9
PR11	CMPLCODE	0	50	0	30	40	50	50	38.5	14.2	24.3	52.7
PR12	CMPLTEST	0	50	0	36	45	45	50	37.3	15.2	22.1	52.4
PR13	MREQPROS	0	50	30	40	45	50	50	44.0	6.8	37.2	50.8
PR14	MREQMEM	0	50	20	40	50	50	50	44.0	9.9	34.1	53.9
PR81	SIZESW	0	200	80	103	155	178	200	141.5	39.2	102.3	180.7
PR82	COMPLETE	0	150	20	96	128	135	145	109.8	37.1	72.7	146.8
PR83	MEETREQS	0	100	50	80	90	100	100	88.0	14.0	74.0	102.0
PR84	PRODUCT	0	700	235	384	455	500	520	430.8	85.3	345.4	516.1

NUMBER OF CLUSTERS	PRCO																			
	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0
	1	5	7	2	6	6	7	7	1	6	7	7	8	7	7	3	7	0	4	9
	0	0	2	0	2	3	4	5	0	1	6	8	0	1	7	0	3	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
19	*	*	*	*	*	*	*	*	*	*	*	*****	*	*	*	*	*	*	*	*
18	*	*	*	*	*	*****	*	*	*	*	*	*****	*	*	*	*	*	*	*	*
17	*	*	*	*	*	*****	*	*	*	*	*	*****	*****	*	*	*	*	*	*	*
16	*	*	*	*	*	*****	*****	*****	*****	*****	*****	*****	*	*	*	*	*	*	*	*
15	*****	*	*	*	*	*****	*****	*****	*****	*****	*****	*****	*	*	*	*	*	*	*	*
14	*****	*	*	*	*****	*****	*****	*****	*****	*****	*****	*****	*	*	*	*	*	*	*	*
13	*****	*	*	*	*****	*****	*****	*****	*****	*****	*****	*****	*****	*	*	*	*	*	*	*
12	*****	*	*	*	*****	*****	*****	*****	*****	*****	*****	*****	*****	*	*	*	*	*	*	*
11	*****	*	*	*	*****	*****	*****	*****	*****	*****	*****	*****	*****	*	*	*	*	*	*	*
10	*****	*	*	*	*****	*****	*****	*****	*****	*****	*****	*****	*****	*	*	*	*	*	*	*
9	*****	*	*	*	*****	*****	*****	*****	*****	*****	*****	*****	*****	*	*	*	*	*	*	*
8	*****	*	*	*	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*	*	*
7	*****	*	*	*	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*	*
6	*****	*	*	*	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*
5	*****	*	*	*	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*
4	*****	*	*	*	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*
3	*****	*	*	*	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*
2	*****	*	*	*	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*
1	*****	*	*	*	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*

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Figure A.4.2-2. Software Product: Cluster Map for 20 Independent Systems

Table A.4.2-5. Software Product: Summary Statistics for 9 Large Systems

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
PRO1	COST	0	50	0	8	25	45	45	26.7	18.2	8.5	44.9
PRO2	TIMELY	0	50	0	23	30	35	50	28.3	14.1	14.2	42.5
PRO3	CONFIDNC	0	50	10	25	30	40	50	32.2	12.0	20.2	44.2
PRO4	SIZNEWSW	0	50	20	20	30	40	40	31.1	9.3	21.8	40.4
PRO5	SIZEXTSW	0	50	0	0	0	20	30	8.9	12.7	-3.8	21.6
PRO6	SIZSLTSW	0	50	10	15	30	40	50	30.0	14.1	15.9	44.1
PRO7	SIZOLDSW	0	50	30	40	40	45	50	41.1	6.0	35.1	47.1
PRO8	READABLE	0	50	30	30	30	40	50	35.6	7.3	28.3	42.8
PRO9	RELIEDOC	0	50	0	30	40	45	50	35.6	15.1	20.5	50.6
PR10	CMPLDESG	0	50	10	20	30	40	40	28.9	10.5	18.3	39.4
PR11	CMPLCODE	0	50	0	20	30	45	50	31.1	16.9	14.2	48.0
PR12	CMPLTEST	0	50	0	10	35	50	50	30.0	20.8	9.2	50.8
PR13	MREQPROS	0	50	30	40	50	50	50	44.4	7.3	37.2	51.7
PR14	MREQMEM	0	50	20	35	50	50	50	42.2	10.9	31.3	53.2
PR81	SIZESW	0	200	80	90	100	135	170	111.1	30.6	80.5	141.7
PR82	COMPLETE	0	150	20	45	95	130	140	90.0	46.4	43.6	136.4
PR83	MEETREQS	0	100	50	80	90	100	100	86.7	16.6	70.1	103.2
PR84	PRODUCT	0	700	235	285	375	460	510	375.0	95.9	279.1	470.9

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NUMBER OF CLUSTERS	PRCO									
	0	0	0	0	0	0	1	0	0	
	1	5	2	6	3	7	0	4	9	
	0	0	0	1	0	3	0	0	0	
	0	0	0	0	0	0	0	0	0	
9	*	*	*	*	*	*	*	*	*	*
8	*****	*	*	*	*	*	*	*	*	*
7	*****	*	*	*	*	*****	*	*	*	*
6	*****	*	*	*	*	*****	*	*	*	*
5	*****	*	*	*	*	*****	*	*	*	*
4	*****	*	*	*	*	*****	*	*	*	*
3	*****	*	*	*	*	*****	*	*	*	*
2	*****	*	*	*	*	*****	*	*	*	*
1	*****	*	*	*	*	*****	*	*	*	*

Figure A.4.2-3. Software Product: Cluster Map
for 9 Large Systems

Table A.4.2-6. Software Product: Summary Statistics for
11 Small Systems

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
PRO1	COST	0	50	0	5	15	35	50	20.5	18.4	2.1	38.8
PRO2	TIMELY	0	50	20	30	30	40	50	33.6	8.1	25.5	41.7
PRO3	CONFIDNC	0	50	30	40	40	50	50	40.9	7.0	33.9	47.9
PRO4	SIZNEWSW	0	50	30	30	40	40	50	39.1	7.0	32.1	46.1
PRO5	SIZEXTSW	0	50	0	20	40	50	50	34.5	17.5	17.0	52.1
PRO6	SIZSLTSW	0	50	40	40	50	50	50	46.4	5.0	41.3	51.4
PRO7	SIZOLDSW	0	50	30	40	50	50	50	46.4	6.7	39.6	53.1
PRO8	READABLE	0	50	30	30	50	50	50	42.7	9.0	33.7	51.8
PRO9	RELIEDOC	0	50	30	40	50	50	50	44.5	6.9	37.7	51.4
PR10	CMPLDESG	0	50	30	30	40	40	50	38.2	7.5	30.7	45.7
PR11	CMPLCODE	0	50	30	40	50	50	50	44.5	8.2	36.3	52.7
PR12	CMPLTEST	0	50	40	40	45	45	45	43.2	2.5	40.7	45.7
PR13	MREQPROS	0	50	30	40	40	50	50	43.6	6.7	36.9	50.4
PR14	MREQMEM	0	50	20	40	50	50	50	45.5	9.3	36.1	54.8
PR81	SIZESW	0	200	110	160	160	190	200	166.4	25.8	140.6	192.2
PR82	COMPLETE	0	150	100	110	130	135	145	125.9	15.8	110.1	141.7
PR83	MEETREQS	0	100	60	80	90	100	100	89.1	12.2	76.9	101.3
PR84	PRODUCT	0	700	410	450	480	515	520	476.4	37.2	439.1	513.6

NUMBER OF CLUSTERS	PRCO										
	0	0	0	0	1	0	0	0	0	0	0
	6	6	7	7	1	7	7	7	7	8	7
	2	3	4	5	0	1	7	6	8	0	2
	0	0	0	0	0	0	0	0	0	0	0
11	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*	*	*	*	*	*****	*	*
9	*	*****	*	*	*	*	*	*	*****	*	*
8	*	*****	*****	*****	*	*	*	*	*****	*	*
7	*****	*****	*****	*****	*	*	*	*	*****	*	*
6	*****	*****	*****	*****	*****	*****	*	*****	*	*	*
5	*****	*****	*****	*****	*****	*****	*****	*****	*****	*	*
4	*****	*****	*****	*****	*****	*****	*****	*****	*****	*	*
3	*****	*****	*****	*****	*****	*****	*****	*****	*****	*	*
2	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*
1	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****

Figure A.4.2-4. Software Product: Cluster Map
for 11 Small Systems

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A.4.3 PRODUCT/PROCESS PERFORMANCE

--	--	Objective	--	X	--	Subjective
--	--	Absolute	--	X	--	Relative
--	--	Explicit	--	X	--	Derived
--	X	Static	--	--	--	Dynamic
--	--	Predictive	--	X	--	Explanatory

This category also measures the quality of the development process and the development product. These measures are subjective because quality is judged relatively. They are dynamic in the sense that an extreme new case could cause a reevaluation of the samples. They are explanatory in that they cannot be determined until the project is complete, although typical, average, or trend values can be extracted from the samples for prediction.

The remainder of this subsection contains tables and figures that describe the Product/Process Performance measures with brief phrases, raw numbers, simple statistics, and graphics. These tables and figures include

- Descriptions of the measures with code numbers, mnemonic names, acceptable values, and brief phrases (Table A.4.3-1)
- Values of the measures for 25 systems (Table A.4.3-2), where larger values indicate a higher quality process or product
- Summary statistics for 11 projects (Table A.4.3-3)
- Cluster map for 11 projects (Figure A.4.3-1)
- Summary statistics for 20 independent systems (Table A.4.3-4)
- Cluster map for 20 independent systems (Figure A.4.3-2)

- Summary statistics for 9 large systems
(Table A.4.3-5)
- Cluster map for 9 large systems (Figure A.4.3-3)
- Summary statistics for 11 small systems
(Table A.4.3-6)
- Cluster map for 11 small systems (Figure A.4.3-4)

Table A.4.3-1. Product/Process Performance: Description of Measures

Code	Measure	Range		Description
		Low	High	
Product				
PP01	RELIABLE	00	50	Reliability
PP02	PERFORMC	00	50	Performance
PP03	OPCONSID	00	50	Operational Considerations
PP04	EZTEST	00	50	Ease of Testing
PP05		00	00	Not Defined
PP06		00	00	Not Defined
Process				
PP07	VISIBILT	00	50	Visibility
PP08	PLANFOLO	00	50	Planning and Followthrough
PP09	STABLSCH	00	50	Stable Schedule
PP10	SWPERTRB	00	50	Stable With Perturbations
PP11	TIMLYREC	00	50	Timeliness of Records
PP12		00	00	Not Defined
PP13		00	00	Not Defined
PP14		00	00	Not Defined
PP15		00	00	Not Defined
PP81	PRODUCT	000	200	Sum PP01 Through PP04
PP82	PROCESS	000	250	Sum PP07 Through PP11
PP83	PRODPROS	000	450	Sum PP81 and PP82

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Table A.4.3-2. Product/Process Performance: Values of the Measures for 25 Systems

PRC0	PP01	PP02	PP03	PP04	PP07	PP08	PP09	PP10
0100	45	45	35	45	45	45	40	30
0200	45	45	35	40	25	30	30	35
0300	30	20	20	20	20	20	20	20
0400	0	0	0	0	0	0	0	0
0500	50	45	35	45	50	50	50	50
0600	40	45	45	45	45	45	40	45
0700	35	35	30	30	35	35	30	35
0800	50	50	50	50	45	45	50	50
0900	30	10	10	0	10	0	0	20
1000	35	40	30	35	35	30	30	30
1100	40	40	30	40	35	35	30	40
9000	35	25	20	20	25	15	15	25
0610	40	45	45	45	45	45	40	45
0620	30	40	40	35	30	35	30	30
0630	35	45	45	45	35	40	40	40
0631	40	50	50	50	40	40	50	40
0632	30	40	40	35	40	40	30	40
0710	40	35	40	40	35	35	30	40
0720	50	50	40	50	50	50	50	50
0730	30	25	15	20	35	25	30	25
0740	40	45	40	45	30	40	40	40
0750	30	35	35	30	25	25	30	25
0760	50	45	40	40	40	40	30	45
0770	30	35	45	35	25	30	30	30
0780	45	40	45	40	35	35	50	40

PRC0	PP11	PP81	PP82	PP83
0100	35	170	215	385
0200	0	165	120	285
0300	20	90	110	200
0400	0	0	0	0
0500	50	175	250	425
0600	45	175	220	395
0700	30	130	165	295
0800	30	200	220	420
0900	10	50	40	90
1000	30	140	155	295
1100	20	150	160	310
9000	20	100	100	200
0610	50	175	225	400
0620	30	145	155	300
0630	40	170	195	365
0631	45	190	215	405
0632	30	145	180	325
0710	30	155	170	325
0720	30	190	230	420
0730	35	90	150	240
0740	35	170	185	355
0750	25	130	130	260
0760	30	175	185	360
0770	30	145	145	290
0780	35	170	195	365

Table A.4.3-3. Product/Process Performance: Summary Statistics
for 11 Projects

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
PP01	RELIABLE	0	50	0	30	40	45	50	36.4	14.0	22.4	50.3
PP02	PERFORMC	0	50	0	20	40	45	50	34.1	16.6	17.5	50.6
PP03	OPCONSID	0	50	0	20	30	35	50	29.1	14.5	14.6	43.6
PP04	EZTEST	0	50	0	20	40	45	50	31.8	17.8	14.0	49.6
PP07	VISIBILT	0	50	0	20	35	45	50	31.4	16.0	15.4	47.3
PP08	PLANFOLO	0	50	0	20	35	45	50	30.5	17.4	13.1	47.8
PP09	STABLSCH	0	50	0	30	30	40	50	30.0	16.7	13.3	46.7
PP10	SWPERTRB	0	50	0	20	35	50	50	34.1	15.8	18.3	49.9
PP11	TIMLYREC	0	50	0	10	30	35	50	24.5	16.5	8.0	41.0
PP81	PRODUCT	0	200	0	90	150	175	200	131.4	61.0	70.4	192.3
PP82	PROCESS	0	250	0	110	160	220	250	150.5	78.4	72.1	228.9
PP83	PRODPROS	0	450	0	200	295	395	425	281.8	136.8	145.0	418.6

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	PRCO										
NUMBER OF CLUSTERS	0	0	0	0	0	0	1	1	0	0	0
	1	6	5	8	2	7	0	1	3	4	9
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
11	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*	*	*****	*	*	*	*	*
9	*****	*	*	*	*	*****	*	*	*	*	*
8	*****	*	*	*	*	*****	*	*	*	*	*
7	*****	*****	*	*	*	*****	*	*	*	*	*
6	*****	*****	*	*	*	*****	*	*	*	*	*
5	*****	*****	*****	*****	*****	*****	*	*	*	*	*
4	*****	*****	*****	*****	*****	*****	*	*****	*****	*****	*****
3	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
2	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****

Figure A.4.3-1. Product/Process Performance: Cluster Map for 11 Projects

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Table A.4.3-4. Product/Process Performance: Summary Statistics for 20 Independent Systems

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
PP01	RELIABLE	0	50	0	30	40	45	50	37.3	11.6	25.6	48.9
PP02	PERFORMC	0	50	0	35	40	45	50	36.8	13.3	23.4	50.1
PP03	OPCONSID	0	50	0	30	38	44	50	33.8	13.1	20.7	46.8
PP04	EZTEST	0	50	0	31	40	45	50	35.0	14.5	20.5	49.5
PP07	VISIBILT	0	50	0	25	35	44	50	32.5	12.7	19.8	45.2
PP08	PLANFOLD	0	50	0	26	35	44	50	32.8	13.9	18.8	46.7
PP09	STABLSCH	0	50	0	30	30	40	50	33.0	13.8	19.2	46.8
PP10	SWPERTRB	0	50	0	26	40	45	50	35.3	12.9	22.3	48.2
PP11	TIMLYREC	0	50	0	21	30	35	50	28.3	13.3	14.9	41.6
PP81	PRODUCT	0	200	0	133	160	174	200	142.8	49.7	93.0	192.5
PP82	PROCESS	0	250	0	134	165	210	250	161.8	62.0	99.8	223.7
PP83	PRODPROS	0	450	0	266	318	380	425	304.5	109.2	195.3	413.7

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NUMBER OF CLUSTERS	PRCO																			
	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0
	1	6	5	7	8	6	7	7	7	2	7	6	0	7	7	1	3	7	4	9
	0	1	0	2	0	3	4	8	6	0	5	2	0	7	1	0	0	3	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
19	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
18	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
17	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
16	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
15	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
14	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
13	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
12	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
11	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
9	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
8	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
7	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
6	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
5	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
4	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
3	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
1	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

Figure A.4.3-2. Product/Process Performance: Cluster Map for 20 Independent Systems

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Table A.4.3-5. Product/Process Performance: Summary Statistics
for 9 Large Systems

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
PP01	RELIABLE	0	50	0	30	35	45	50	33.9	14.7	19.1	48.6
PP02	PERFORMC	0	50	0	15	40	45	45	30.6	17.4	13.2	48.0
PP03	OPCONSID	0	50	0	13	30	35	45	25.0	14.6	10.4	39.6
PP04	EZTEST	0	50	0	10	35	45	45	27.8	18.6	9.2	46.3
PP07	VISIBILT	0	50	0	15	35	45	50	29.4	17.0	12.4	46.5
PP08	PLANFOLO	0	50	0	10	30	45	50	27.2	18.4	8.8	45.6
PP09	STABLSCH	0	50	0	15	30	40	50	27.8	17.2	10.6	44.9
PP10	SWPERTRB	0	50	0	20	30	48	50	30.6	16.5	14.1	47.0
PP11	TIMLYREC	0	50	0	5	30	43	50	25.6	19.3	6.3	44.8
PP81	PRODUCT	0	200	0	70	140	173	175	117.2	63.3	54.0	180.5
PP82	PROCESS	0	250	0	75	150	220	250	140.6	83.8	56.8	224.4
PP83	PRODPROS	0	450	0	145	285	393	425	257.8	143.5	114.3	401.3

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NUMBER OF CLUSTERS	PRCO									
	0	0	0	0	1	0	0	0	0	0
	1	6	5	2	0	3	7	4	9	
	0	1	0	0	0	0	3	0	0	
	0	0	0	0	0	0	0	0	0	
9	*	*	*	*	*	*	*	*	*	*
8	*****		*	*	*	*	*	*	*	*
7	*****	*		*****		*	*	*	*	*
6	*****	*****		*****		*	*	*	*	*
5	*****			*****		*****		*	*	*
4	*****			*****		*****		*****		*
3	*****			*****		*****		*****		*****
2	*****			*****		*****		*****		*****
1	*****			*****		*****		*****		*****

Figure A.4.3-3. Product/Process Performance: Cluster Map
for 9 Large Systems

Table A.4.3-6. Product/Process Performance: Summary Statistics
for 11 Small Systems

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
PPO1	RELIABLE	0	50	30	30	40	50	50	40.0	8.1	31.9	48.1
PPO2	PERFORMC	0	50	35	35	40	45	50	41.8	5.6	36.2	47.4
PPO3	OPCONSID	0	50	30	40	40	45	50	40.9	5.4	35.5	46.3
PPO4	EZTEST	0	50	30	35	40	45	50	40.9	6.3	34.7	47.2
PPO7	VISIBILT	0	50	25	30	35	40	50	35.0	7.7	27.3	42.7
PPO8	PLANFOLO	0	50	25	35	35	40	50	37.3	6.8	30.4	44.1
PPO9	STABLSCH	0	50	30	30	30	50	50	37.3	9.0	28.2	46.3
PP10	SWPERTRB	0	50	25	30	40	45	50	39.1	8.0	31.1	47.1
PP11	TIMLYREC	0	50	20	30	30	35	40	30.5	5.2	25.2	35.7
PP81	PRODUCT	0	200	130	145	170	175	200	163.6	20.9	142.8	184.5
PP82	PROCESS	0	250	130	155	185	195	230	179.1	30.7	148.4	209.8
PP83	PRODPROS	0	450	260	300	355	365	420	342.7	51.2	291.5	393.9

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	PRCO										
NUMBER OF CLUSTERS	0	0	0	1	0	0	0	0	0	0	0
	6	7	7	1	7	6	7	7	7	7	8
	2	7	1	0	5	3	4	8	6	2	0
	0	0	0	0	0	0	0	0	0	0	0
11	*	*	*	*	*	*	*	*	*	*	*
10	*****	*	*	*	*	*	*	*	*	*	*
9	*****	*	*	*	*	*****	*	*	*	*	*
8	*****	*	*	*	*	*****	*	*	*	*****	*
7	*****	*	*	*	*	*****	*	*	*	*****	*
6	*****	*****	*	*	*	*****	*	*	*	*****	*
5	*****	*****	*	*	*	*****	*	*	*	*****	*
4	*****	*****	*	*	*	*****	*	*	*	*****	*
3	*****	*****	*	*	*	*****	*	*	*	*****	*
2	*****	*****	*	*	*	*****	*	*	*	*****	*
1	*****	*****	*	*	*	*****	*	*	*	*****	*

Figure A.4.3-4. Product/Process Performance: Cluster Map for 11 Small Systems

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A.5 DEVELOPMENT TEAM BACKGROUND CLASS OF MEASURES.

The Development Team Background class measures team experience in several ways, including

- Team Rank (RK01 through RK40)
 - Design (RK01 through RK10)
 - Implementation (RK11 through RK20)
 - Testing (RK21 through RK30)
 - Overall (RK31 through RK40)
- Years of Professional Experience (YP01 through YP40)
 - Design (YP01 through YP10)
 - Implementation (YP11 through YP20)
 - Testing (YP21 through YP30)
 - Overall (YP31 through YP40)
- Years of Applicable Experience (YA01 through YA40)
 - Design (YA01 through YA10)
 - Implementation (YA11 through YA20)
 - Testing (YA21 through YA30)
 - Overall (YA31 through YA40)
- Years of Environment Experience (YE01 through YE40)
 - Design (YE01 through YE10)
 - Implementation (YE11 through YE20)
 - Testing (YE21 through YE30)
 - Overall (YE31 through YE40)

A.5.1 TEAM RANK

- <u>X</u> - Objective	- <u>X</u> - Subjective
- <u>X</u> - Absolute	- <u>X</u> - Relative
- <u>X</u> - Explicit	- <u>X</u> - Derived
- <u>X</u> - Static	- <u>X</u> - Dynamic
- <u>X</u> - Predictive	- <u>X</u> - Explanatory

This category measures on-the-job experience of the development team, who are a part of the development environment. These measures are derived from objective data by combining

the experience of each team member to form a team value. They are static and predictive because they are computed from data available before the design, implementation, and testing phases. They are dynamic and explanatory in the sense that the values for each phase can be updated to be more accurate as each phase is completed, since the composition of the development team may have changed during a phase. Codes ending in 1, 5, 8, and 9 are unique; the others are derived. The overall measures are derived from the phase measures.

The remainder of this subsection contains tables and figures that describe the Team Rank measures with brief phrases, raw numbers, simple statistics, and graphics. These tables and figures include

- Descriptions of the measures with code numbers, mnemonic names, acceptable values, and brief phrases (Table A.5.1-1)
- Values of the measures for 25 systems (Table A.5.1-2), where small values indicate a higher rank, i.e., a more skilled team
- Summary statistics for 11 projects (Table A.5.1-3)
- Cluster map for 11 projects (Figure A.5.1-1)
- Summary statistics for 20 independent systems (Table A.5.1-4)
- Cluster map for 20 independent systems (Figure A.5.1-2)
- Summary statistics for 9 large systems (Table A.5.1-5)
- Cluster map for 9 large systems (Figure A.5.1-3)

- Summary statistics for 11 small systems
(Table A.5.1-6)
- Cluster map for 11 small systems (Figure A.5.1-4)

Table A.5.1-1. Team Rank: Description of Measures (1 of 3)

Code	Measure	Range		Description
		Low	High	
Design				
RK01	DPROG	050	970	Programmers
				Technical Staff
RK02	DTSPROJ	046	844	Programmers and Project Managers
RK03	DTSANALY	043	787	Programmers, Project Managers, and Analysis Managers
RK04	DTSDEVEL	043	787	Programmers and Development Managers
Development Management				
RK05	DDMPROJ	031	477	Project
RK06	DDMANALY	031	477	Project and Analysis
RK07	DDMDEVEL	031	477	Development
Interface Management				
RK08	DIMANALY	031	477	Analysis
RK09	DIMDEVEL	031	477	Development
RK10	D	000	000	Not-Defined
Implementation				
RK11	IPROG	050	970	Programmers
				Technical Staff
RK12	ITSPROJ	046	844	Programmers and Project Managers
RK13	ITSANALY	043	787	Programmers, Project Managers, and Analysis Managers
RK14	ITSDEVEL	043	787	Programmers and Development Managers
Development Management				
RK15	IDMPROJ	031	477	Project
RK16	IDMANALY	031	477	Project and Analysis
RK17	IDMDEVEL	031	477	Development

Table A.5.1-1. Team Rank: Description of Measures (2 of 3)

Code	Measure	Range		Description
		Low	High	
Implementation (Continued)				
Interface Management				
RK18	IIMANALY	031	477	Analysis
RK19	IIMDEVEL	031	477	Development
RK20	I	000	000	Not Defined
Test				
RK21	TPROG	050	970	Programmers
Technical Staff				
RK22	TTSPROJ	046	844	Programmers and Project Managers
RK23	TTSANALY	043	787	Programmers, Project Managers, and Analysis Managers
RK24	TTSDEVEL	043	787	Programmers and Development Managers
Development Management				
RK25	TDMPROJ	031	477	Project
RK26	TDMANALY	031	477	Project and Analysis
RK27	TDMDEVEL	031	477	Development
Interface Management				
RK28	TIMANALY	031	477	Analysis
RK29	TIMDEVEL	031	477	Development
RK30	T	000	000	Not Defined
Overall				
RK31	OPROG	050	970	Programmers
Technical Staff				
RK32	OTSPROJ	046	844	Programmers and Project Managers
RK33	OTSANALY	043	787	Programmers, Project Managers, and Analysis Managers

Table A.5.1-1. Team Rank: Description of Measures (3 of 3)

<u>Code</u>	<u>Measure</u>	<u>Range</u>		<u>Description</u>
		<u>Low</u>	<u>High</u>	
				Overall (Continued)
				Technical Staff (Continued)
RK34	OTSDEVEL	043	787	Programmers and Development Managers
				Development Management
RK35	ODMPROJ	031	477	Project
RK36	ODMANALY	031	477	Project and Analysis
RK37	ODMDEVEL	031	477	Development
				Interface Management
RK38	OIMANALY	031	477	Analysis
RK39	OIMDEVEL	031	477	Development
RK40	O	000	000	Not Defined

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Table A.5.1-2. Team Rank: Values of the Measures for
25 Systems (1 of 2)

PRCO	RK01	RK02	RK03	RK04	RK05	RK06	RK07	RK08	RK09
0100	432	333	295	320	116	121	153	130	267
0200	472	372	333	310	145	147	116	147	71
0300	497	419	391	375	206	221	196	254	176
0400	477	379	343	346	148	159	165	183	210
0500	368	310	284	257	153	156	109	160	55
0600	372	295	270	275	120	130	139	150	186
0700	543	427	323	284	157	169	112	190	56
0800	183	162	162	174	103	124	154	179	346
0900	432	368	336	340	198	192	200	179	202
1000	368	295	275	273	124	139	135	179	160
1100	468	399	361	320	204	198	130	188	53
9000	387	326	301	295	162	167	159	179	153
0610	387	304	278	284	120	130	139	150	186
0620	333	281	270	278	177	162	181	134	186
0630	326	264	228	249	110	97	133	77	194
0631	275	221	194	208	90	85	109	77	159
0632	522	432	357	395	202	147	202	77	202
0710	577	487	436	387	249	228	153	190	56
0720	287	264	254	225	192	192	127	190	56
0730	625	522	463	411	254	230	153	190	56
0740	571	482	432	383	249	228	153	190	56
0750	527	432	391	340	192	194	122	198	50
0760	638	538	477	419	264	237	157	190	56
0770	638	538	477	419	264	237	157	190	56
0780	554	449	399	350	194	188	121	176	47

PRCO	RK11	RK12	RK13	RK14	RK15	RK16	RK17	RK18	RK19
0100	395	301	270	289	103	112	141	129	257
0200	445	340	295	278	114	114	91	115	58
0300	482	399	372	357	188	204	176	239	154
0400	463	375	340	343	160	165	170	176	190
0500	383	310	287	257	137	144	101	160	55
0600	289	232	214	219	95	108	114	137	164
0700	379	298	281	247	119	139	91	194	52
0800	221	186	176	194	93	103	142	127	340
0900	395	379	340	353	320	235	270	127	188
1000	395	368	330	336	275	212	228	127	156
1100	407	395	368	320	350	292	181	200	48
9000	395	375	336	336	301	230	232	133	138
0610	310	244	225	230	95	108	114	137	164
0620	249	219	202	208	130	122	139	110	159
0630	375	295	264	278	113	115	135	121	196
0631	336	259	289	295	93	101	111	121	159
0632	472	399	350	368	204	170	204	121	204
0710	387	333	310	273	179	183	119	194	52
0720	190	177	179	157	138	154	100	194	52
0730	387	326	304	267	164	174	112	194	52
0740	497	415	375	330	200	198	127	194	52
0750	522	423	379	333	183	179	116	176	47
0760	407	336	313	275	157	169	110	194	52
0770	340	301	284	249	181	185	120	194	52
0780	482	379	343	301	147	154	101	167	48

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Table A.5.1-2. Team Rank: Values of the Measures for
25 Systems (2 of 2)

PRCO	RK21	RK22	RK23	RK24	RK25	RK26	RK27	RK28	RK29
0100	289	214	198	206	65	80	94	124	200
0200	387	304	278	252	116	129	91	159	56
0300	458	375	343	333	172	174	159	176	134
0400	379	310	284	289	138	142	153	153	185
0500	364	292	273	242	121	137	93	174	56
0600	330	254	232	237	91	104	110	135	159
0700	375	289	267	235	102	122	79	176	47
0800	217	186	181	192	101	118	147	159	313
0900	449	343	304	307	113	121	127	139	162
1000	391	310	281	281	124	129	129	141	138
1100	449	379	346	304	200	190	124	176	47
9000	403	320	289	284	127	133	125	144	120
0610	304	239	221	223	91	103	110	135	159
0620	307	264	244	249	147	142	150	135	159
0630	391	310	278	289	120	124	142	133	202
0631	350	273	247	254	99	110	119	133	169
0632	487	411	361	379	210	181	210	133	210
0710	415	346	320	278	170	172	111	176	47
0720	156	147	148	130	118	134	86	176	47
0730	399	330	301	264	151	159	103	176	47
0740	517	423	379	333	186	183	118	176	47
0750	487	399	361	317	179	177	116	174	49
0760	156	147	148	130	118	134	86	176	47
0770	357	307	287	252	164	167	109	176	47
0780	477	379	340	301	148	154	102	167	49

PRCO	RK31	RK32	RK33	RK34	RK35	RK36	RK37	RK38	RK39
0100	368	278	252	267	93	102	127	127	239
0200	432	340	301	278	125	129	98	139	62
0300	477	399	368	353	188	198	176	221	154
0400	440	353	320	326	148	156	162	170	194
0500	372	304	281	252	135	145	101	164	56
0600	326	259	237	242	101	113	120	141	170
0700	427	333	289	254	124	142	93	186	52
0800	206	177	172	186	99	114	148	154	333
0900	423	364	326	333	194	176	190	147	183
1000	383	323	295	295	162	157	159	147	151
1100	440	391	357	313	242	223	142	188	49
9000	395	340	307	304	185	172	167	151	137
0610	330	262	239	244	101	113	120	141	170
0620	295	254	237	244	150	141	156	126	167
0630	364	289	257	273	114	112	137	108	198
0631	320	249	239	249	93	98	113	108	162
0632	497	415	357	379	206	165	206	108	206
0710	454	383	350	307	196	192	126	186	52
0720	204	190	188	167	147	159	103	186	52
0730	458	383	350	307	185	185	121	186	52
0740	527	440	395	346	210	202	131	186	52
0750	512	419	375	330	185	185	119	183	49
0760	343	298	281	247	170	176	114	186	52
0770	427	368	336	298	200	194	127	186	52
0780	502	403	361	317	162	165	109	170	48

Table A.5.1-3. Team Rank: Summary Statistics for 11 Projects

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
RK01	DPROG	50	970	183	368	432	477	543	419.3	96.7	322.6	516.0
RK02	DTSPROJ	46	844	162	295	368	399	427	341.7	75.7	266.1	417.4
RK03	DTSANALY	43	787	162	275	323	343	391	306.6	60.9	245.7	367.6
RK04	DTSDEVEL	43	787	174	273	310	340	375	297.6	54.3	243.3	352.0
RK05	DDMPROJ	31	477	103	120	148	198	206	152.2	36.5	115.7	188.7
RK06	DDMANALY	31	477	121	130	156	192	221	159.6	32.6	127.1	192.2
RK07	DDMDEVEL	31	477	109	116	139	165	200	146.3	31.2	115.1	177.5
RK08	DIMANALY	31	477	130	150	179	188	254	176.3	32.2	144.0	208.5
RK09	DIMDEVEL	31	477	53	56	176	210	346	162.3	95.8	66.4	258.1
RK11	IIPROG	50	970	221	379	395	445	482	386.7	74.8	311.9	461.6
RK12	ITSPROJ	46	844	186	298	340	379	399	325.7	68.8	256.9	394.5
RK13	ITSANALY	43	787	176	270	295	340	372	297.5	61.7	235.8	359.2
RK14	ITSDEVEL	43	787	194	247	289	343	357	290.3	56.2	234.0	346.5
RK15	IDMPROJ	31	477	93	103	137	275	350	177.6	94.1	83.5	271.8
RK16	IDMANALY	31	477	103	112	144	212	292	166.2	61.9	104.2	228.1
RK17	IDMDEVEL	31	477	91	101	142	181	270	155.0	57.5	97.5	212.5
RK18	IIMANALY	31	477	115	127	137	194	239	157.4	39.9	117.4	197.3
RK19	IIMDEVEL	31	477	48	55	156	190	340	151.1	94.0	57.1	245.1
RK21	TPOG	50	970	217	330	379	449	458	371.6	72.6	299.1	444.2
RK22	TTS PROJ	46	844	186	254	304	343	379	296.0	60.4	235.6	356.4
RK23	TTSANALY	43	787	181	232	278	304	346	271.5	52.1	219.4	323.7
RK24	TTSDEVEL	43	787	192	235	252	304	333	261.6	44.5	217.1	306.1
RK25	TDMPROJ	31	477	65	101	116	138	200	122.1	37.4	84.7	159.5
RK26	TDMANALY	31	477	80	118	129	142	190	131.5	30.3	101.2	161.7
RK27	TDMDEVEL	31	477	79	93	124	147	159	118.7	27.4	91.4	146.1
RK28	TIMANALY	31	477	124	139	159	176	176	155.6	18.8	136.9	174.4
RK29	TIMDEVEL	31	477	47	56	138	185	313	136.1	82.3	53.8	218.4
RK31	OIPROG	50	970	206	368	423	440	477	390.4	74.6	315.8	464.9
RK32	OTSPROJ	46	844	177	278	333	364	399	320.1	64.1	256.0	384.2
RK33	OTSANALY	43	787	172	252	295	326	368	290.7	55.8	234.9	346.6
RK34	OTSDEVEL	43	787	186	252	278	326	353	281.7	48.4	233.3	330.2
RK35	ODMPROJ	31	477	93	101	135	188	242	146.5	46.5	99.9	193.0
RK36	ODMANALY	31	477	102	114	145	176	223	150.5	37.3	113.2	187.7
RK37	ODMDEVEL	31	477	93	101	142	162	190	137.8	32.7	105.1	170.6
RK38	OIMANALY	31	477	127	141	154	186	221	162.2	27.4	134.8	189.6
RK39	OIMDEVEL	31	477	49	56	154	194	333	149.4	90.1	59.2	239.5

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OF POOR QUALITY

	PRCO										
NUMBER OF CLUSTERS	0	0	0	0	0	0	0	0	1	1	0
	1	6	2	7	5	3	4	9	0	1	8
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
11	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*****	*	*	*	*	*	*	*	*
9	*	*	*****	*	*	*	*	*****	*	*	*
8	*	*	*****	*****	*	*	*	*****	*	*	*
7	*	*	*****	*****	*****	*****	*****	*****	*	*	*
6	*****	*****	*****	*****	*****	*****	*****	*****	*	*	*
5	*****	*****	*****	*****	*****	*****	*****	*****	*****	*	*
4	*****	*****	*****	*****	*****	*****	*****	*****	*****	*	*
3	*****	*****	*****	*****	*****	*****	*****	*****	*****	*	*
2	*****	*****	*****	*****	*****	*****	*****	*****	*****	*	*
1	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****

Figure A.5.1-1. Team Rank: Cluster Map for 11 Projects

Table A.5.1-4. Team Rank: Summary Statistics for 20 Independent Systems

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
RK01	DPROG	50	970	183	368	470	567	638	458.0	124.9	333.1	582.9
RK02	DTSPROJ	46	844	162	297	376	474	538	379.9	104.1	275.8	484.0
RK03	OTSANALY	43	787	162	276	340	424	477	344.3	88.5	255.7	432.8
RK04	OTSDEVEL	43	787	174	274	330	381	419	323.0	67.4	255.6	390.4
RK05	DDMPROJ	31	477	103	129	192	238	264	183.1	54.1	129.0	237.2
RK06	DDMANALY	31	477	97	141	190	226	237	179.0	43.7	135.3	222.7
RK07	DDMDEVEL	31	477	109	128	153	157	200	147.7	25.0	122.7	172.7
RK08	DIMANALY	31	477	77	153	181	190	254	173.7	35.0	138.7	208.7
RK09	DIMDEVEL	31	477	47	56	65	192	346	127.1	89.2	37.9	216.3
RK11	IIPROG	50	970	190	349	395	459	522	386.6	89.5	297.1	476.1
RK12	ITSPROJ	46	844	177	297	335	379	423	325.0	72.5	252.5	397.6
RK13	ITSANALY	43	787	176	266	307	342	379	297.8	63.1	234.7	360.9
RK14	ITSDEVEL	43	787	157	251	278	332	357	281.4	55.1	226.3	336.5
RK15	IDMPROJ	31	477	93	118	159	187	350	171.3	70.5	100.8	241.9
RK16	IDMANALY	31	477	103	117	167	195	292	166.1	48.3	117.8	214.4
RK17	IDMDEVEL	31	477	91	111	124	163	270	139.6	45.6	94.0	185.3
RK18	IIMANALY	31	477	110	127	172	194	239	163.8	36.9	126.9	200.6
RK19	IIMDEVEL	31	477	47	52	57	182	340	118.6	85.8	32.8	204.4
RK21	TPOG	50	970	156	305	389	449	517	367.4	102.9	264.6	470.3
RK22	TTSPOJ	46	844	147	245	310	368	423	300.2	79.7	220.5	379.9
RK23	TTSANALY	43	787	148	227	283	335	379	275.8	67.6	208.2	343.3
RK24	TTSDEVEL	43	787	130	228	271	303	333	258.6	58.7	199.9	317.3
RK25	TDMPROJ	31	477	65	117	131	169	200	137.1	34.5	102.6	171.6
RK26	TDMANALY	31	477	80	125	140	171	190	143.4	28.4	115.0	171.9
RK27	TDMDEVEL	31	477	86	96	114	139	159	117.5	23.2	94.3	140.7
RK28	TIMANALY	31	477	124	140	171	176	176	160.0	18.7	141.4	178.7
RK29	TIMDEVEL	31	477	47	47	56	161	313	109.5	77.2	32.3	186.8
RK31	OPROG	50	970	204	348	425	457	527	397.8	90.4	307.4	488.3
RK32	OTSPROJ	46	844	177	281	347	389	440	330.9	73.3	257.6	404.2
RK33	OTSANALY	43	787	172	253	311	355	395	302.0	62.8	239.2	364.9
RK34	OTSDEVEL	43	787	167	248	297	324	353	284.1	50.0	234.1	334.2
RK35	ODMPROJ	31	477	93	128	162	193	242	160.3	40.7	119.6	201.0
RK36	ODMANALY	31	477	102	132	162	190	223	161.2	34.6	126.6	195.8
RK37	ODMDEVEL	31	477	98	115	127	154	190	133.3	25.3	108.0	158.6
RK38	OIMANALY	31	477	108	143	170	186	221	165.0	28.0	137.0	193.1
RK39	OIMDEVEL	31	477	48	52	59	180	333	118.3	83.4	34.8	201.7

	PRCO																			
NUMBER OF CLUSTERS	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0
	1	6	6	6	2	5	3	4	9	0	7	7	7	7	7	7	1	7	7	8
	0	1	2	3	0	0	0	0	0	0	1	3	7	4	5	8	0	6	2	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
19	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
18	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
17	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
16	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
15	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
14	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
13	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
12	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
11	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
9	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
8	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
7	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
6	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
5	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
4	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
3	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
1	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

Figure A.5.1-2. Team Rank: Cluster Map for 20 Independent Systems

Table A.5.1-5. Team Rank: Summary Statistics for
9 Large Systems

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
RK01	DPROG	50	970	368	378	432	487	625	450.9	80.7	370.2	531.6
RK02	DTSPROJ	46	844	295	307	368	399	522	366.9	71.1	295.8	438.0
RK03	DTSANALY	43	787	275	281	333	367	463	333.1	61.9	271.3	395.0
RK04	DTSDEVEL	43	787	257	279	320	361	411	324.0	49.8	274.2	373.8
RK05	DDMPROJ	31	477	116	122	148	202	254	162.7	46.9	115.8	209.5
RK06	DDMANALY	31	477	121	135	156	207	230	166.1	39.3	126.8	205.4
RK07	DDMDEVEL	31	477	109	126	153	181	200	151.8	31.6	120.1	183.4
RK08	DIMANALY	31	477	130	149	179	187	254	174.7	35.7	138.9	210.4
RK09	DIMDEVEL	31	477	55	65	176	206	267	154.0	75.5	78.5	229.5
RK11	IPROG	50	970	310	385	395	454	482	406.1	51.3	354.9	457.4
RK12	ITSPROJ	46	844	244	306	340	377	399	338.0	48.5	289.5	386.5
RK13	ITSANALY	43	787	225	279	304	340	372	307.0	44.1	262.9	351.1
RK14	ITSDEVEL	43	787	230	262	289	348	357	301.1	47.0	254.2	348.1
RK15	IDMPROJ	31	477	95	109	160	232	320	172.9	77.7	95.2	250.5
RK16	IDMANALY	31	477	108	113	165	208	235	163.1	47.1	116.0	210.3
RK17	IDMDEVEL	31	477	91	107	141	202	270	155.9	61.2	94.7	217.1
RK18	IIMANALY	31	477	115	127	137	185	239	156.0	40.6	115.4	196.6
RK19	IIMDEVEL	31	477	52	57	156	189	257	141.6	71.8	69.8	213.3
RK21	TPOG	50	970	289	334	387	424	458	380.0	56.7	323.3	436.7
RK22	TTSPPROJ	46	844	214	266	310	337	375	301.9	49.7	252.2	351.6
RK23	TTSANALY	43	787	198	247	281	303	343	275.9	43.5	232.4	319.3
RK24	TTSDEVEL	43	787	206	233	264	298	333	266.3	40.5	225.8	306.9
RK25	TDMPROJ	31	477	65	102	121	145	172	121.2	31.5	89.8	152.7
RK26	TDMANALY	31	477	80	112	129	151	174	130.4	28.0	102.4	158.5
RK27	TDMDEVEL	31	477	91	94	110	141	159	117.7	25.8	91.9	143.5
RK28	TIMANALY	31	477	124	137	153	175	176	153.0	19.5	133.5	172.5
RK29	TIMDEVEL	31	477	47	56	138	174	200	126.3	58.7	67.6	185.1
RK31	OPROG	50	970	330	370	423	449	477	409.2	48.3	360.9	457.5
RK32	OTSPROJ	46	844	262	291	340	374	399	334.0	46.5	287.5	380.5
RK33	OTSANALY	43	787	239	267	301	338	368	303.6	42.6	261.0	346.1
RK34	OTSDEVEL	43	787	244	260	295	330	353	295.0	37.8	257.2	332.8
RK35	ODMPROJ	31	477	93	113	148	187	194	147.9	37.4	110.5	185.3
RK36	ODMANALY	31	477	102	121	156	181	198	151.2	32.4	118.8	183.7
RK37	ODMDEVEL	31	477	98	111	127	169	190	139.3	33.3	106.1	172.6
RK38	OIMANALY	31	477	127	140	147	178	221	160.2	29.0	131.2	189.3
RK39	OIMDEVEL	31	477	52	59	154	189	239	140.1	67.7	72.4	207.8

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	PRCO								
NUMBER OF	0	0	0	0	0	0	0	1	0
CLUSTERS	1	6	2	5	3	4	9	0	7
	0	1	0	0	0	0	0	0	3
	0	0	0	0	0	0	0	0	0
9	*	*	*	*	*	*	*	*	*
8	*	*	*****	*	*	*	*	*	*
7	*****	*****	*	*	*	*	*	*	*
6	*****	*****	*	*	*****	*	*	*	*
5	*****	*****	*****	*****	*****	*****	*****	*	*
4	*****	*****	*****	*****	*****	*****	*****	*	*
3	*****	*****	*****	*****	*****	*****	*****	*	*
2	*****	*****	*****	*****	*****	*****	*****	*	*
1	*****	*****	*****	*****	*****	*****	*****	*	*

Figure A.5.1-3. Team Rank: Cluster Map for 9 Large Systems

Table A.5.1-6. Team Rank: Summary Statistics for 11 Small Systems

CODE	NAME	-ALLOWED-RANGE-		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
RK01	DPROG	50	970	183	326	527	577	638	463.8	156.0	307.8	619.8
RK02	DTSPROJ	46	844	162	264	432	487	538	390.5	127.5	263.0	518.1
RK03	DTSANALY	43	787	162	254	391	436	477	353.4	107.8	245.5	461.2
RK04	DTSEVEL	43	787	174	249	340	387	419	322.2	81.5	240.7	403.7
RK05	DDMPROJ	31	477	103	177	194	249	264	199.8	55.9	144.0	255.7
RK06	DDMANALY	31	477	97	162	194	228	237	189.5	46.0	143.5	235.6
RK07	DDMDEVEL	31	477	121	127	153	157	181	144.4	18.9	125.4	163.3
RK08	DIMANALY	31	477	77	176	190	190	198	172.9	36.2	136.7	209.1
RK09	DIMDEVEL	31	477	47	53	56	186	346	105.1	96.8	8.3	201.9
RK11	IIPROG	50	970	190	249	387	482	522	370.6	111.8	258.8	482.4
RK12	ITSPROJ	46	844	177	219	333	395	423	314.5	88.6	225.9	403.0
RK13	ITSANALY	43	787	176	202	310	368	379	290.3	76.6	213.6	366.9
RK14	ITSDEVEL	43	787	157	208	275	320	333	265.3	58.1	207.2	323.3
RK15	IDMPROJ	31	477	93	130	157	183	350	170.1	67.9	102.1	238.0
RK16	IDMANALY	31	477	103	122	169	185	292	168.5	51.4	117.1	220.0
RK17	IDMDEVEL	31	477	100	110	120	139	181	126.4	23.0	103.4	149.3
RK18	IIMANALY	31	477	110	127	194	194	200	170.1	34.2	135.9	204.3
RK19	IIMDEVEL	31	477	47	48	52	159	340	99.8	94.9	4.9	194.7
RK21	TPOG	50	970	156	217	391	477	517	357.2	131.4	225.7	488.6
RK22	TTSPOJ	46	844	147	186	310	379	423	298.8	100.4	198.4	399.2
RK23	TTSANALY	43	787	148	181	287	346	379	275.6	84.7	191.0	360.3
RK24	TTSDEVEL	43	787	130	192	278	304	333	252.3	71.6	180.6	323.9
RK25	TDMPROJ	31	477	101	118	148	179	200	150.1	32.5	117.5	182.6
RK26	TDMANALY	31	477	118	134	154	177	190	154.1	25.1	129.0	179.2
RK27	TDMDEVEL	31	477	86	102	116	142	150	117.4	22.2	95.2	139.5
RK28	TIMANALY	31	477	133	159	176	176	176	165.8	16.6	149.2	182.4
RK29	TIMDEVEL	31	477	47	47	47	159	313	95.8	90.1	5.8	185.9
RK31	OPROG	50	970	204	295	427	502	527	388.5	116.0	272.6	504.5
RK32	OTSPROJ	46	844	177	254	368	403	440	328.4	92.1	236.3	420.4
RK33	OTSANALY	43	787	172	237	336	361	395	300.8	77.8	223.0	378.6
RK34	OTSDEVEL	43	787	167	244	298	317	346	275.3	58.4	216.8	333.7
RK35	ODMPROJ	31	477	99	147	170	200	242	170.5	42.1	128.3	212.6
RK36	ODMANALY	31	477	112	141	176	194	223	169.4	35.5	133.8	204.9
RK37	ODMDEVEL	31	477	103	114	127	142	156	128.4	16.5	111.8	144.9
RK38	OIMANALY	31	477	108	154	186	186	188	169.0	27.9	141.1	196.9
RK39	OIMDEVEL	31	477	48	49	52	167	333	100.4	93.7	6.7	194.1

	PRCO										
NUMBER OF CLUSTERS	0	0	0	0	0	0	0	0	0	1	0
	6	6	8	7	7	7	7	7	7	1	7
	2	3	0	2	1	7	4	5	8	0	6
	0	0	0	0	0	0	0	0	0	0	0
11	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*	*	*	*	*	*	*	*
9	*	*	*	*	*	*	*	*	*	*	*
8	*	*	*	*	*	*	*	*	*	*	*
7	*****	*	*	*****	*****	*****	*****	*****	*	*	*
6	*****	*	*	*****	*****	*****	*****	*****	*	*	*
5	*****	*	*	*****	*****	*****	*****	*****	*	*	*
4	*****	*	*	*****	*****	*****	*****	*****	*	*	*
3	*****	*	*	*****	*****	*****	*****	*****	*	*	*
2	*****	*	*	*****	*****	*****	*****	*****	*	*	*
1	*****	*	*	*****	*****	*****	*****	*****	*	*	*

Figure A.5.1-4. Team Rank: Cluster Map for 11 Small Systems

ORIGINAL PAGE IS
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A.5.2 YEARS OF PROFESSIONAL EXPERIENCE

<u> X </u>	Objective	<u> X </u>	Subjective
<u> - </u>	Absolute	<u> X </u>	Relative
<u> - </u>	Explicit	<u> X </u>	Derived
<u> X </u>	Static	<u> - </u>	Dynamic
<u> X </u>	Predictive	<u> - </u>	Explanatory

This category measures professional experience of the development team, who are a part of the development environment. These measures are derived from explicit objective data by combining the experience of each team member is combined to form a team value. They are static and predictive since they are computed from data available before the design, implementation, and testing phases. They are dynamic and explanatory in the sense that the values for each phase can be updated to be more accurate as each phase is completed, since the composition of the development team may have changed during a phase. Codes ending in 1, 5, 8, and 9 are unique; the others are derived. The overall measures are derived from the phase measures.

The remainder of this subsection contains tables and figures that describe the Years of Professional Experience measures with brief phrases, raw numbers, simple statistics, and graphics. These tables and figures include

- Descriptions of the measures with code numbers, mnemonic names, acceptable values, and brief phrases (Table A.5.2-1)
- Values of the measures for 25 systems (Table A.5.2-2), where large values indicate more experience
- Summary statistics for 11 projects (Table A.5.2-3)
- Cluster map for 11 projects (Figure A.5.2-1)

- Summary statistics for 20 independent systems (Table A.5.2-4)
- Cluster map for 20 independent systems (Figure A.5.2-2)
- Summary statistics for 9 large systems (Table A.5.2-5)
- Cluster map for 9 large systems (Figure A.5.2-3)
- Summary statistics for 11 small systems (Table A.5.2-6)
- Cluster map for 11 small systems (Figure A.5.2-4)

Table A.5.2-1. Years of Professional Experience:
Description of Measures (1 of 3)

Code	Measure	Range		Description
		Low	High	
Design				
YP01	DPROG	020	200	Programmers Technical Staff
YP02	DTSPROJ	023	210	Programmers and Project Managers
YP03	DTSANALY	025	215	Programmers, Project Mana- gers, and Analysis Managers
YP04	DTSDLEVEL	025	215	Programmers and Development Managers
Development Management				
YP05	DDMPROJ	035	250	Project
YP06	DDMANALY	035	250	Project and Analysis
YP07	DDMDEVEL	035	250	Development
Implementation Management				
YP08	IDMANALY	035	250	Analysis
YP09	IDMDEVEL	035	250	Development
YP10	-D-	000	000	Not Defined
Implementation				
YP11	IIPROG	020	200	Programmers Technical Staff
YP12	ITSPROJ	023	210	Programmers and Project Managers
YP13	ITSANALY	025	215	Programmers, Project Mana- gers, and Analysis Managers
YP14	ITSDEVEL	025	215	Programmers and Development Managers
Development Management				
YP15	IDMPROJ	035	250	Project
YP16	IDMANALY	035	250	Project and Analysis
YP17	IDMDEVEL	035	250	Development

Table A.5.2-1. Years of Professional Experience:
Description of Measures (2 of 3)

Code	Measure	Range		Description
		Low	High	
Implementation (Continued)				
Interface Management				
YP18	IIMANALY	035	250	Analysis
YP19	IIMDEVEL	035	250	Development
YP20	I	000	000	Not Defined
Test				
YP21	TPROG	020	200	Programmers
Technical Staff				
YP22	TTSPROJ	023	210	Programmers and Project Managers
YP23	TTSANALY	025	215	Programmers, Project Managers, and Analysis Managers
YP24	TTSDEVEL	025	215	Programmers and Development Managers
Development Management				
YP25	TDMPROJ	035	250	Project
YP26	TDMANALY	035	250	Project and Analysis
YP27	TDMDEVEL	035	250	Development
Interface Management				
YP28	TIMANALY	035	250	Analysis
YP29	TIMDEVEL	035	250	Development
YP30	T	000	000	Not Defined
Overall				
YP31	OPROG	020	200	Programmers
Technical Staff				
YP32	OTSPROJ	023	210	Programmers and Project Managers
YP33	OTSANALY	025	215	Programmers, Project Managers, and Analysis Managers

Table A.5.2-1. Years of Professional Experience:
Description of Measures (3 of 3)

<u>Code</u>	<u>Measure</u>	<u>Range</u>		<u>Description</u>
		<u>Low</u>	<u>High</u>	
				Overall (Continued)
				Technical Staff (Continued)
YP34	OTSDEVEL	025	215	Programmers and Development Managers
				Development Management
YP35	ODMPROJ	035	250	Project
YP36	ODMANALY	035	250	Project and Analysis
YP37	ODMDEVEL	035	250	Development
				Interface Management
YP38	OIMANALY	035	250	Analysis
YP39	OIMDEVEL	035	250	Development
YP40	O	000	000	Not Defined

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Table A.5.2-2. Years of Professional Experience: Values of
the Measures for 25 Systems (1 of 2)

PRCO	YP01	YP02	YP03	YP04	YP05	YP06	YP07	YP08	YP09
0100	44	55	64	58	102	113	91	136	70
0200	76	88	93	93	134	132	134	129	133
0300	58	71	75	78	120	114	125	102	136
0400	60	68	74	70	96	107	90	128	78
0500	51	54	63	63	66	91	91	142	142
0600	66	68	81	70	73	116	78	201	89
0700	89	97	101	103	128	127	135	126	150
0800	150	148	149	136	141	146	105	157	33
0900	75	76	84	78	81	106	84	157	91
1000	102	106	111	106	118	131	113	157	103
1100	31	38	51	52	65	96	98	159	165
9000	85	87	94	90	96	116	100	157	108
0610	62	64	78	67	73	116	78	201	89
0620	114	110	118	107	92	128	91	201	89
0630	46	53	69	57	81	124	83	209	86
0631	49	55	71	60	80	123	85	209	96
0632	53	59	75	62	84	126	84	209	84
0710	34	46	55	57	92	103	111	126	150
0720	140	138	137	139	132	130	138	126	150
0730	101	106	109	111	129	128	136	126	150
0740	105	108	110	112	119	121	129	126	150
0750	73	81	87	89	111	118	126	132	156
0760	57	65	72	75	99	108	116	126	150
0770	57	65	72	75	99	108	116	126	150
0780	32	44	54	57	93	107	115	134	158

PRCO	YP11	YP12	YP13	YP14	YP15	YP16	YP17	YP18	YP19
0100	46	58	67	61	105	116	94	139	73
0200	70	84	90	90	138	136	138	133	137
0300	56	66	71	74	106	106	117	106	140
0400	67	72	78	73	91	104	88	131	81
0500	55	58	66	67	69	92	94	137	145
0600	69	71	85	73	78	120	83	207	94
0700	88	96	101	103	132	131	139	130	154
0800	132	134	136	125	146	145	100	142	38
0900	83	85	91	86	92	109	94	144	98
1000	98	107	112	108	146	145	134	144	110
1100	43	49	60	62	74	99	106	150	170
9000	85	91	97	94	114	124	114	144	115
0610	66	68	82	71	78	120	83	207	94
0620	116	113	122	111	99	135	98	209	96
0630	76	78	92	79	85	128	86	214	90
0631	51	57	73	62	82	126	88	212	98
0632	125	117	126	114	88	130	88	214	88
0710	43	54	62	65	98	109	117	129	153
0720	144	142	140	143	136	134	142	130	154
0730	101	107	110	113	132	131	139	130	154
0740	101	105	108	110	122	124	132	129	153
0750	74	82	88	90	112	120	127	134	157
0760	78	87	92	95	124	126	134	130	154
0770	60	69	76	78	102	111	119	130	154
0780	28	43	54	57	105	116	124	136	160

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Table A.5.2-2. Years of Professional Experience: Values of the Measures for 25 Systems (2 of 2)

PRCD	YP21	YP22	YP23	YP24	YP25	YP26	YP27	YP28	YP29
0100	52	62	72	65	100	118	93	154	80
0200	77	88	93	94	130	130	134	129	141
0300	56	67	79	76	111	133	122	177	145
0400	77	81	87	82	96	110	93	136	86
0500	58	60	69	70	72	94	97	140	148
0600	72	74	88	77	82	125	87	212	98
0700	93	101	105	108	136	135	143	134	158
0800	130	134	136	125	150	149	114	146	42
0900	91	101	106	102	139	141	128	145	105
1000	101	110	102	112	147	146	136	143	115
1100	45	51	62	64	76	103	109	156	176
9000	92	101	106	104	136	139	131	145	121
0610	69	72	86	75	82	125	87	212	98
0620	124	120	129	118	102	139	101	214	100
0630	78	80	94	81	87	130	88	216	92
0631	53	60	76	64	85	128	90	215	101
0632	127	119	128	116	90	132	90	216	90
0710	51	61	70	72	103	114	122	134	158
0720	148	146	145	147	140	138	146	134	158
0730	106	112	115	117	137	136	144	134	158
0740	113	116	118	120	127	129	137	134	158
0750	77	85	91	93	115	123	130	137	160
0760	151	149	148	150	143	141	149	137	161
0770	67	75	82	85	109	118	126	136	160
0780	29	44	55	58	106	117	125	137	161

PRCD	YP31	YP32	YP33	YP34	YP35	YP36	YP37	YP38	YP39
0100	48	58	68	61	102	116	93	143	74
0200	74	86	92	93	134	133	135	130	137
0300	57	68	75	76	112	118	122	128	140
0400	68	73	80	75	95	107	90	132	82
0500	55	58	66	66	69	92	94	140	145
0600	69	71	85	73	78	120	83	206	94
0700	90	98	102	105	132	131	139	130	154
0800	137	139	139	129	146	147	106	148	38
0900	83	87	94	89	104	119	102	148	98
1000	100	108	108	109	137	141	128	148	109
1100	40	46	58	59	72	99	104	155	170
9000	88	93	99	96	115	126	115	149	115
0610	65	68	82	71	78	120	83	206	94
0620	118	114	123	112	98	134	97	208	95
0630	67	70	85	72	84	127	86	213	89
0631	51	57	74	62	82	126	88	212	98
0632	101	98	110	97	87	129	87	213	87
0710	43	54	62	65	98	108	116	130	154
0720	144	142	141	143	136	134	142	130	154
0730	102	108	111	114	132	132	140	130	154
0740	106	110	112	114	122	125	133	130	154
0750	75	82	88	91	113	120	128	134	158
0760	95	101	104	106	122	125	133	131	155
0770	62	70	77	79	103	112	120	130	154
0780	29	44	54	57	102	113	121	136	160

Table A.5.2-3. Years of Professional Experience: Summary Statistics
for 11 Projects

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
YP01	DPROG	20	200	31	51	66	89	150	72.9	32.5	40.4	105.4
YP02	DTSPROJ	23	210	38	55	71	97	148	79.0	30.2	48.8	109.2
YP03	DTSANALY	25	215	51	64	81	101	149	86.0	27.2	58.8	113.2
YP04	DTSDEVEL	25	215	52	63	78	103	136	82.5	24.9	57.5	107.4
YP05	DDMPROJ	35	250	65	73	102	128	141	102.2	27.9	74.3	130.1
YP06	DDMANALY	35	250	91	106	114	131	146	116.3	16.5	99.8	132.8
YP07	DDMDEVEL	35	250	78	90	98	125	135	104.0	20.1	83.9	124.1
YP08	DIMANALY	35	250	102	128	142	157	201	144.9	25.7	119.2	170.6
YP09	DIMDEVEL	35	250	33	78	103	142	165	108.2	40.3	67.9	148.5
YP11	IPROG	20	200	43	55	69	88	132	73.4	25.9	47.4	99.3
YP12	ITSPROJ	23	210	49	58	72	96	134	80.0	24.9	55.1	104.9
YP13	ITSANALY	25	215	60	67	85	101	136	87.0	22.7	64.3	109.7
YP14	ITSDEVEL	25	215	61	67	74	103	125	83.8	20.7	63.1	104.6
YP15	IDMPROJ	35	250	69	78	105	138	146	107.0	29.1	77.9	136.1
YP16	IDMANALY	35	250	92	104	116	136	145	118.5	18.5	100.0	136.9
YP17	IDMDEVEL	35	250	83	94	100	134	139	107.9	20.7	87.2	128.6
YP18	IIMANALY	35	250	106	131	139	144	207	142.1	24.4	117.7	166.5
YP19	IIMDEVEL	35	250	38	81	110	145	170	112.7	40.1	72.6	152.9
YP21	TPROG	20	200	45	56	77	93	130	77.5	25.1	52.3	102.6
YP22	TTSPROJ	23	210	51	62	81	101	134	84.5	25.1	59.3	109.6
YP23	TTSANALY	25	215	62	72	88	105	136	90.8	21.0	69.8	111.9
YP24	TTSDEVEL	25	215	64	70	82	108	125	88.6	20.7	67.9	109.4
YP25	TDMPROJ	35	250	72	82	111	139	150	112.6	29.1	83.5	141.8
YP26	TDMANALY	35	250	94	110	130	141	149	125.8	17.8	108.0	143.6
YP27	TDMDEVEL	35	250	87	93	114	134	143	114.2	19.8	94.4	134.0
YP28	TIMANALY	35	250	129	136	145	156	212	152.0	23.8	128.2	175.8
YP29	TIMDEVEL	35	250	42	86	115	148	176	117.6	39.9	77.7	157.6
YP31	OPROG	20	200	40	55	69	90	137	74.6	27.4	47.2	102.1
YP32	OTSPROJ	23	210	46	58	73	98	139	81.1	26.6	54.5	107.7
YP33	OTSANALY	25	215	58	68	85	102	139	87.9	23.0	64.9	110.9
YP34	OTSDEVEL	25	215	59	66	76	105	129	85.0	22.2	62.8	107.2
YP35	ODMPROJ	35	250	69	78	104	134	146	107.4	27.4	80.0	134.7
YP36	ODMANALY	35	250	92	107	119	133	147	120.3	17.0	103.3	137.2
YP37	ODMDEVEL	35	250	83	93	104	128	139	108.7	19.3	89.5	128.0
YP38	OIMANALY	35	250	128	130	143	148	206	146.2	21.8	124.3	168.0
YP39	OIMDEVEL	35	250	38	82	109	145	170	112.8	40.0	72.9	152.8

	PRCO										
NUMBER OF CLUSTERS	0	0	0	0	0	0	1	0	0	1	0
	1	4	9	6	3	5	1	2	7	0	8
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
11	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*	*	*	*	*	*	*	*
9	*****	*	*	*	*	*	*	*****	*	*	*
8	*****	*	*	*	*	*	*	*****	*	*	*
7	*****	*	*	*	*	*	*	*****	*	*	*
6	*****	*	*	*	*	*	*	*****	*	*	*
5	*****	*	*	*	*	*	*	*****	*	*	*
4	*****	*	*	*	*	*	*	*****	*	*	*
3	*****	*	*	*	*	*	*	*****	*	*	*
2	*****	*	*	*	*	*	*	*****	*	*	*
1	*****	*	*	*	*	*	*	*****	*	*	*

Figure A.5.2-1. Years of Professional Experience: Cluster Map for 11 Projects

Table A.5.2-4. Years of Professional Experience: Summary Statistics for 20 Independent Systems

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
YPO1	DPROG	20	200	31	47	61	102	150	73.4	34.6	38.8	108.0
YPO2	DTSPROJ	23	210	38	54	70	106	148	79.2	31.0	48.2	110.2
YPO3	DTSANALY	25	215	51	65	77	110	149	86.3	27.7	58.5	114.0
YPO4	DTSDEVEL	25	215	52	59	77	107	139	84.0	26.6	57.4	110.6
YPO5	DDMPROJ	35	250	65	84	99	120	141	102.1	22.8	79.4	124.9
YPO6	DDMANALY	35	250	91	107	115	128	146	116.3	13.7	102.7	130.0
YPO7	DDMDEVEL	35	250	78	91	112	126	138	108.5	19.2	89.3	127.7
YPO8	DIMANALY	35	250	102	126	133	157	209	145.0	29.0	116.0	174.0
YPO9	DIMDEVEL	35	250	33	89	139	150	165	121.4	37.7	83.7	159.2
YP11	IPROG	20	200	28	55	72	100	144	76.8	30.6	46.2	107.5
YP12	ITSPROJ	23	210	43	60	80	107	142	83.0	27.5	55.6	110.5
YP13	ITSANALY	25	215	54	68	89	110	140	89.8	24.8	65.0	114.7
YP14	ITSDEVEL	25	215	57	68	83	110	143	87.9	23.8	64.1	111.7
YP15	IDMPROJ	35	250	69	91	105	130	146	108.0	23.5	84.5	131.5
YP16	IDMANALY	35	250	92	109	120	133	145	120.3	14.9	105.4	135.2
YP17	IDMDEVEL	35	250	83	94	117	134	142	113.3	19.9	93.4	133.2
YP18	IIMANALY	35	250	106	130	135	144	214	145.2	29.3	115.9	174.5
YP19	IIMDEVEL	35	250	38	95	143	154	170	125.5	37.1	88.4	162.7
YP21	TPROG	20	200	29	57	77	111	151	85.0	34.6	50.4	119.6
YP22	TSPROJ	23	210	44	63	83	115	149	90.7	31.3	59.4	122.0
YP23	TTSANALY	25	215	55	74	92	117	148	96.9	27.4	69.5	124.4
YP24	TTSDEVEL	25	215	58	73	89	118	150	95.3	27.4	67.9	122.7
YP25	TDMPROJ	35	250	72	97	110	139	150	113.6	24.4	89.2	138.0
YP26	TDMANALY	35	250	94	117	130	139	149	126.7	14.6	112.1	141.3
YP27	TDMDEVEL	35	250	87	98	124	136	149	119.0	20.1	99.0	139.1
YP28	TIMANALY	35	250	129	135	139	156	216	152.5	28.6	124.0	181.1
YP29	TIMDEVEL	35	250	42	99	147	160	176	130.1	37.0	93.1	167.1
YP31	OPROG	20	200	29	56	71	102	144	78.4	31.8	46.6	110.2
YP32	OTSPROJ	23	210	44	61	78	108	142	84.3	28.8	55.5	113.1
YP33	OTSANALY	25	215	54	70	87	110	141	90.9	25.4	65.5	116.4
YP34	OTSDEVEL	25	215	57	67	84	111	143	89.0	25.0	64.0	114.1
YP35	ODMPROJ	35	250	69	96	104	130	146	107.9	22.4	85.6	130.3
YP36	ODMANALY	35	250	92	112	120	133	147	121.1	13.8	107.3	134.9
YP37	ODMDEVEL	35	250	83	95	118	132	142	113.6	19.1	94.6	132.7
YP38	OIMANALY	35	250	128	130	135	148	213	147.5	27.7	119.8	175.2
YP39	OIMDEVEL	35	250	38	94	143	154	170	125.7	37.3	88.4	163.0

	PRCD																			
NUMBER OF CLUSTERS	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0
	1	4	9	6	6	3	7	7	5	1	7	7	2	7	7	0	7	7	6	8
	0	0	0	1	3	0	5	7	0	0	1	8	0	3	4	0	6	2	2	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
19	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
18	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
17	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
16	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
15	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
14	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
13	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
12	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
11	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
9	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
8	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
7	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
6	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
5	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
4	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
3	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
1	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

Figure A.5.2-2. Years of Professional Experience: Cluster Map for 20 Independent Systems

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Table A.5.2-5. Years of Professional Experience: Summary
Statistics for 9 Large Systems

CODE	NAME	-ALLOWED-RANGE-		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
YP01	DPROG	20	200	44	55	62	89	102	69.9	20.6	49.3	90.5
YP02	DTSPROJ	23	210	54	60	71	97	106	76.4	19.7	56.8	96.1
YP03	DTSANALY	25	215	63	69	78	101	111	83.4	17.6	65.8	101.1
YP04	DTSDEVEL	25	215	58	65	78	100	111	80.4	18.9	61.6	99.3
YP05	DDMPROJ	35	250	66	77	102	125	134	102.1	24.9	77.2	127.0
YP06	DDMANALY	35	250	91	107	114	130	132	115.3	13.4	101.9	128.7
YP07	DDMDEVEL	35	250	78	87	91	130	136	104.7	22.5	82.2	127.2
YP08	DIMANALY	35	250	102	127	136	157	201	142.0	27.8	114.2	169.8
YP09	DIMDEVEL	35	250	70	84	103	139	150	110.2	30.2	80.0	140.4
YP11	IPROG	20	200	46	56	67	91	101	71.3	19.1	52.2	90.4
YP12	ITSPROJ	23	210	58	62	72	96	107	78.3	18.9	59.5	97.2
YP13	ITSANALY	25	215	66	69	82	101	112	85.2	17.2	68.1	102.4
YP14	ITSDEVEL	25	215	61	69	74	99	113	82.6	18.2	64.4	100.7
YP15	IDMPROJ	35	250	69	85	105	135	146	106.3	27.1	79.2	133.4
YP16	IDMANALY	35	250	92	105	116	134	145	117.7	17.1	100.6	134.7
YP17	IDMDEVEL	35	250	83	91	94	136	139	109.0	23.0	86.0	132.0
YP18	IIMANALY	35	250	106	131	137	144	207	141.2	27.2	114.1	168.4
YP19	IIMDEVEL	35	250	73	88	110	143	154	114.7	30.0	84.7	144.7
YP21	TPROG	20	200	52	57	77	96	106	76.3	19.7	56.6	96.0
YP22	TTSPROJ	23	210	60	65	81	106	112	83.7	20.2	63.5	103.9
YP23	TTSANALY	25	215	69	76	87	104	115	89.9	15.6	74.3	105.5
YP24	TTSDEVEL	25	215	65	73	82	107	117	88.1	18.9	69.2	107.0
YP25	TDMPROJ	35	250	72	89	111	138	147	112.7	26.9	85.7	139.6
YP26	TDMANALY	35	250	94	114	130	139	146	125.9	16.3	109.6	142.2
YP27	TDMDEVEL	35	250	87	93	122	135	144	114.9	22.2	92.7	137.1
YP28	TIMANALY	35	250	129	135	143	166	212	152.2	26.5	125.7	178.7
YP29	TIMDEVEL	35	250	80	92	115	147	158	119.6	29.1	90.4	148.7
YP31	OPROG	20	200	48	56	68	92	102	72.4	19.2	53.2	91.7
YP32	OTSPROJ	23	210	58	63	73	98	108	79.3	19.2	60.1	98.5
YP33	OTSANALY	25	215	66	72	82	101	111	86.2	16.2	70.0	102.4
YP34	OTSDEVEL	25	215	61	69	76	101	114	83.8	18.7	65.1	102.5
YP35	ODMPROJ	35	250	69	87	104	133	137	107.0	24.3	82.7	131.3
YP36	ODMANALY	35	250	92	112	119	133	141	119.8	14.7	105.1	134.5
YP37	ODMDEVEL	35	250	83	92	102	132	140	109.7	21.6	88.1	131.3
YP38	OIMANALY	35	250	128	130	140	148	206	145.0	24.2	120.8	169.2
YP39	OIMDEVEL	35	250	74	88	109	143	154	114.8	29.7	85.1	144.5

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	PRCO								
NUMBER OF	0	0	0	0	0	0	0	0	1
CLUSTERS	1	4	9	6	3	5	2	7	0
	0	0	0	1	0	0	0	3	0
	0	0	0	0	0	0	0	0	0
9	*	*	*	*	*	*	*	*	*
8	*****	*	*	*	*	*	*	*	*
7	*****	*	*	*	*	*	*****	*	*
6	*****	*	*	*	*	*	*****	*	*
5	*****	*	*	*	*	*	*****	*	*
4	*****	*	*	*	*	*	*****	*	*
3	*****	*	*	*	*	*	*****	*	*
2	*****	*	*	*	*	*	*****	*	*
1	*****	*	*	*	*	*	*****	*	*

Figure A.5.2-3. Years of Professional Experience: Cluster Map for 9 Large Systems

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Table A.5.2-6. Years of Professional Experience: Summary Statistics for 11 Small Systems

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
YP01	DPROG	20	200	31	34	57	114	150	76.3	43.8	32.4	120.1
YP02	DTSPROJ	23	210	38	46	65	110	148	81.5	38.8	42.7	120.2
YP03	DTSANALY	25	215	51	55	72	118	149	88.5	34.6	53.9	123.2
YP04	DTSDEVEL	25	215	52	57	75	112	139	86.9	32.2	54.7	119.1
YP05	DDMPROJ	35	250	65	92	99	119	141	102.2	22.1	80.0	124.3
YP06	DDMANALY	35	250	96	107	118	128	146	117.2	14.5	102.7	131.7
YP07	DDMDEVEL	35	250	83	98	115	126	138	111.6	16.5	95.1	128.2
YP08	DIMANALY	35	250	126	126	132	159	209	147.5	31.0	116.5	178.4
YP09	DIMDEVEL	35	250	33	89	150	156	165	130.6	42.1	88.6	172.7
YP11	IIPROG	20	200	28	43	76	116	144	81.4	38.0	43.4	119.3
YP12	ITSPROJ	23	210	43	54	82	113	142	86.9	33.4	53.5	120.3
YP13	ITSANALY	25	215	54	62	92	122	140	93.6	30.0	63.6	123.6
YP14	ITSDEVEL	25	215	57	65	90	111	143	92.3	27.6	64.7	119.9
YP15	IDMPROJ	35	250	74	98	105	124	146	109.4	21.4	87.9	130.8
YP16	IDMANALY	35	250	99	111	124	134	145	122.5	13.2	109.2	135.7
YP17	IDMDEVEL	35	250	86	100	119	132	142	116.8	17.4	99.4	134.2
YP18	IIMANALY	35	250	129	130	134	150	214	148.5	31.9	116.6	180.3
YP19	IIMDEVEL	35	250	38	96	154	157	170	134.5	41.3	93.2	175.7
YP21	TIPROG	20	200	29	51	78	130	151	92.1	42.9	49.2	135.0
YP22	TITSPROJ	23	210	44	61	85	134	149	96.5	38.1	58.4	134.5
YP23	TITSANALY	25	215	55	70	94	136	148	102.7	33.9	68.8	136.7
YP24	TITSDEVEL	25	215	58	72	93	125	150	101.2	32.4	68.7	133.6
YP25	TIDMPROJ	35	250	76	102	109	140	150	114.4	23.5	90.9	137.8
YP26	TIDMANALY	35	250	103	117	129	139	149	127.4	13.8	113.6	141.1
YP27	TIDMDEVEL	35	250	88	109	125	137	149	122.5	18.6	103.9	141.0
YP28	TIMANALY	35	250	134	134	137	156	216	152.8	31.4	121.4	184.3
YP29	TIMDEVEL	35	250	42	100	158	161	176	138.7	41.8	97.0	180.5
YP31	OIPROG	20	200	29	43	75	118	144	83.3	39.6	43.7	122.8
YP32	OTSPROJ	23	210	44	54	82	114	142	88.4	35.2	53.2	123.6
YP33	OTSANALY	25	215	54	62	88	123	141	94.8	31.3	63.5	126.2
YP34	OTSDEVEL	25	215	57	65	91	114	143	93.4	29.4	64.0	122.8
YP35	ODMPROJ	35	250	72	98	103	122	146	108.7	21.8	86.9	130.6
YP36	ODMANALY	35	250	99	112	125	134	147	122.2	13.7	108.5	135.8
YP37	ODMDEVEL	35	250	86	104	120	133	142	116.9	17.1	99.8	134.0
YP38	OIMANALY	35	250	130	130	134	155	213	149.5	31.3	118.3	180.8
YP39	OIMDEVEL	35	250	38	95	154	158	170	134.6	41.6	93.0	176.3

NUMBER OF CLUSTERS	PRCO											
	0	0	0	0	1	0	0	0	0	0	0	0
	6	6	7	7	1	7	7	7	7	7	7	8
	2	3	1	8	0	4	6	5	7	2	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
11	*	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*****	*	*	*	*	*	*	*	*	*
9	*	*	*****	*	*	*	*	*****	*	*	*	*
8	*	*	*****	*	*	*	*	*****	*	*	*	*
7	*	*	*****	*	*	*	*	*****	*	*	*	*
6	*	*	*****	*	*	*	*	*****	*	*	*	*
5	*****	*****	*****	*****	*****	*****	*****	*****	*	*	*	*
4	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
3	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
2	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****

Figure A.5.2-4. Years of Professional Experience:
Cluster Map for 11 Small Systems

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A.5.3 YEARS OF APPLICABLE EXPERIENCE

- <u>X</u> -	Objective	- <u> </u> -	Subjective
- <u> </u> -	Absolute	- <u>X</u> -	Relative
- <u> </u> -	Explicit	- <u>X</u> -	Derived
- <u>X</u> -	Static	- <u> </u> -	Dynamic
- <u>X</u> -	Predictive	- <u> </u> -	Explanatory

This category measures the development team's experience that is applicable to the application. The development team is a part of the development environment. These measures are derived from explicit objective data by combining the experience of each team member to form a team value. However, the determination of applicable experience is a subjective judgment. These measures are static and predictive since they are computed from data available before the design, implementation, and testing phases. They are dynamic and explanatory in the sense that the values for each phase can be updated to be more accurate as each phase is completed since the composition of the development team may have changed during a phase. Codes ending in 1, 5, 8, and 9 are unique; the others are derived. The overall measures are derived from the phase measures.

The remainder of this subsection contains tables and figures that describe the Years of Applicable Experience measures with brief phrases, raw numbers, simple statistics, and graphics. These tables and figures include

- Descriptions of the measures with code numbers, mnemonic names, acceptable values, and brief phrases (Table A.5.3-1)
- Values of the measures for 25 systems (Table A.5.3-2), where large values indicate more experience
- Summary statistics for 11 projects (Table A.5.3-3)
- Cluster map for 11 projects (Figure A.5.3-1)

- Summary statistics for 20 independent systems (Table A.5.3-4)
- Cluster map for 20 independent systems (Figure A.5.3-2)
- Summary statistics for 9 large systems (Table A.5.3-5)
- Cluster map for 9 large systems (Figure A.5.3-3)
- Summary statistics for 11 small systems (Table A.5.3-6)
- Cluster map for 11 small systems (Figure A.5.3-4)

Table A.5.3-1. Years of Applicable Experience: Description of Measures (1 of 3)

Code	Measure	Range		Description
		Low	High	
Design				
YA01	DPROG	010	175	Programmers Technical Staff
YA02	DTSPROJ	014	185	Programmers and Project Managers
YA03	DTSANALY	016	190	Programmers, Project Managers, and Analysis Managers
YA04	DTSDEVEL	016	190	Programmers and Development Managers
Development Management				
YA05	DDMPROJ	030	225	Project
YA06	DDMANALY	030	225	Project and Analysis
YA07	DDMDEVEL	030	225	Development
Interface Management				
YA08	DIMANALY	030	225	Analysis
YA09	DIMDEVEL	030	225	Development
YA10	D	000	000	Not Defined
Implementation				
YA11	IPROG	010	175	Programmers Technical Staff
YA12	ITSPROJ	014	185	Programmers and Project Managers
YA13	ITSANALY	016	190	Programmers, Project Managers, and Analysis Managers
YA14	ITSDEVEL	016	190	Programmers and Development Managers
Development Management				
YA15	IDMPROJ	030	225	Project
YA16	IDMANALY	030	225	Project and Analysis
YA17	IDMDEVEL	030	225	Development

Table A.5.3-1. Years of Applicable Experience: Description of Measures (2 of 3)

Code	Measure	Range		Description
		Low	High	
Implementation (Continued)				
Interface Management				
YA18	IIMANALY	030	225	Analysis
YA19	IIMDEVEL	030	225	Development
YA20	I	000	000	Not Defined
Test				
YA21	TPROG	010	175	Programmers
Technical Staff				
YA22	TTSPROJ	014	185	Programmers and Project Managers
YA23	TTSANALY	016	190	Programmers, Project Managers, and Analysis Managers
YA24	TTSDEVEL	016	190	Programmers and Development Managers
Development Management				
YA25	TDMPROJ	030	225	Project
YA26	TDMANALY	030	225	Project and Analysis
YA27	TDMDEVEL	030	225	Development
Interface Management				
YA28	TIMANALY	030	225	Analysis
YA29	TIMDEVEL	030	225	Development
YA30	T	000	000	Not Defined
Overall				
YA31	OPROG	010	175	Programmers
Technical Staff				
YA32	OTSPROJ	014	185	Programmers and Project Managers
YA33	OTSANALY	016	190	Programmers, Project Managers, and Analysis Managers

Table A.5.3-1. Years of Applicable Experience: Description of Measures (3 of 3)

<u>Code</u>	<u>Measure</u>	<u>Range</u>		<u>Description</u>
		<u>Low</u>	<u>High</u>	
				Overall (Continued)
				Technical Staff (Continued)
YA34	OTSDEVEL	016	190	Programmers and Development Managers
				Development Management
YA35	ODMPROJ	030	225	Project
YA36	ODMANALY	030	225	Project and Analysis
YA37	ODMDEVEL	030	225	Development
				Interface Management
YA38	OIMANALY	030	225	Analysis
YA39	OIMDEVEL	030	225	Development
YA40	O	000	000	Not Defined

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Table A.5.3-2. Years of Applicable Experience: Values of the Measures for 25 Systems (1 of 2)

PRCO	YA01	YA02	YA03	YA04	YA05	YA06	YA07	YA08	YA09
0100	40	52	59	55	100	102	89	106	66
0200	53	63	69	70	102	105	109	111	123
0300	43	54	58	59	100	95	97	83	90
0400	46	54	60	57	86	91	82	100	74
0500	44	48	58	58	68	90	89	135	132
0600	49	54	61	58	74	90	78	120	85
0700	33	46	52	57	100	97	113	91	140
0800	100	102	103	95	113	110	85	105	28
0900	43	48	54	52	71	82	74	105	81
1000	61	67	72	71	92	96	94	105	99
1100	29	36	43	48	63	78	94	107	155
9000	51	57	62	62	79	88	86	105	101
0610	45	51	59	55	75	90	78	120	85
0620	78	78	82	79	78	91	80	118	85
0630	43	52	59	55	86	97	83	120	77
0631	49	55	62	60	82	94	85	120	92
0632	44	50	58	53	74	89	74	120	74
0710	24	34	40	45	72	78	94	91	140
0720	95	96	95	100	98	96	112	91	140
0730	62	69	72	77	95	94	110	91	140
0740	33	42	47	52	75	80	96	91	110
0750	47	55	58	65	85	84	105	84	146
0760	29	37	43	48	72	78	94	91	140
0770	29	37	43	48	72	78	94	91	140
0780	36	45	50	56	80	83	102	89	148

PRCO	YA11	YA12	YA13	YA14	YA15	YA16	YA17	YA18	YA19
0100	43	55	62	58	103	105	92	110	69
0200	52	62	69	70	106	109	113	115	127
0300	43	50	55	55	79	82	84	87	94
0400	50	58	63	61	88	93	84	103	77
0500	45	50	56	59	71	82	92	104	135
0600	53	58	65	62	79	92	83	118	90
0700	55	64	67	73	103	96	117	82	144
0800	87	93	95	88	118	112	90	100	33
0900	55	56	61	59	59	73	68	102	88
1000	61	68	72	72	95	97	98	102	106
1100	37	40	46	52	49	67	86	103	160
9000	56	60	64	65	74	84	85	102	107
0610	49	55	62	59	79	92	83	118	90
0620	81	82	86	83	85	97	87	120	92
0630	72	75	80	76	89	99	86	118	81
0631	46	54	61	59	84	95	88	118	94
0632	120	111	111	107	78	91	78	118	78
0710	33	42	47	53	78	79	100	81	143
0720	98	99	98	104	102	95	116	82	144
0730	66	73	74	80	98	93	113	82	144
0740	38	46	50	57	78	79	99	81	143
0750	48	56	60	66	86	86	106	88	147
0760	46	55	59	65	93	89	110	82	144
0770	48	54	58	64	80	81	101	84	144
0780	34	45	50	56	86	88	108	91	150

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Table A.5.3-2. Years of Applicable Experience: Values of the Measure for 25 Systems (2 of 2)

PRCD	YA21	YA22	YA23	YA24	YA25	YA26	YA27	YA28	YA29
0100	49	58	64	61	97	100	90	107	76
0200	57	66	70	73	100	100	110	100	131
0300	43	51	56	57	84	87	89	92	99
0400	58	65	70	67	94	99	90	109	82
0500	47	52	57	62	73	79	95	91	138
0600	58	63	69	67	84	95	87	117	94
0700	61	70	73	79	108	102	121	89	148
0800	92	98	99	92	122	116	94	104	37
0900	64	72	76	75	104	104	101	104	95
1000	56	69	73	74	119	113	116	102	111
1100	40	47	54	59	74	86	105	110	166
9000	63	72	76	77	108	106	110	104	114
0610	53	59	66	63	84	95	87	117	94
0620	89	89	92	89	88	98	91	118	96
0630	74	77	82	78	91	101	88	120	83
0631	49	57	64	62	87	98	90	120	97
0632	122	113	113	109	80	93	80	120	80
0710	41	50	54	60	83	85	105	89	148
0720	103	104	102	108	106	101	120	89	148
0730	71	77	79	85	103	98	118	89	148
0740	41	50	54	60	83	85	104	89	148
0750	51	59	63	68	88	90	109	92	150
0760	106	107	105	111	109	104	123	92	151
0770	57	63	67	72	89	90	109	91	150
0780	35	46	52	57	88	89	109	92	151

PRCD	YA31	YA32	YA33	YA34	YA35	YA36	YA37	YA38	YA39
0100	44	55	62	58	100	103	90	108	70
0200	54	64	69	71	103	105	111	109	127
0300	43	52	56	57	88	88	90	88	94
0400	51	59	64	62	89	94	86	104	78
0500	45	50	57	60	71	84	92	110	135
0600	53	58	65	62	79	92	83	118	90
0700	50	60	64	70	104	98	117	87	144
0800	93	98	99	92	118	113	90	103	33
0900	54	59	64	62	78	86	81	104	88
1000	60	68	72	72	102	102	103	103	105
1100	35	41	48	53	62	77	95	106	160
9000	57	63	68	68	87	92	94	104	107
0610	49	55	62	59	79	92	83	118	90
0620	83	83	87	84	84	95	86	119	91
0630	63	68	74	70	89	99	86	120	80
0631	48	55	62	60	84	96	88	119	94
0632	95	92	94	90	77	91	77	120	77
0710	33	42	47	53	78	81	100	87	144
0720	99	99	98	104	102	97	116	87	144
0730	66	73	75	81	99	95	114	87	144
0740	38	46	51	56	78	81	100	87	144
0750	49	56	60	66	86	87	107	88	148
0760	60	66	69	75	91	90	109	88	145
0770	44	52	56	62	80	83	102	89	145
0780	35	45	51	57	85	87	106	91	150

Table A.5.3-3. Years of Applicable Experience: Summary Statistics
for 11 Projects

CODE	NAME	--ALLOWED--RANGE		-----ACTUAL--RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
YAO1	DPROG	10	175	29	40	44	53	100	49.2	19.0	30.2	68.2
YAO2	DTSPROJ	14	185	36	48	54	63	102	56.7	17.1	39.6	73.9
YAO3	DTSANALY	16	190	43	54	59	69	103	62.6	15.5	47.2	78.1
YAO4	DTSDEVEL	16	190	48	55	58	70	95	61.8	12.9	48.9	74.7
YAO5	DDMPROJ	30	225	63	71	92	100	113	88.1	16.7	71.4	104.8
YAO6	DDMANALY	30	225	78	90	95	102	110	94.2	9.5	84.7	103.6
YAO7	DDMDEVEL	30	225	74	82	89	97	113	91.3	12.0	79.3	103.3
YAO8	DIMANALY	30	225	83	100	105	111	135	106.2	13.6	92.6	119.8
YAO9	DIMDEVEL	30	225	28	74	90	132	155	97.5	37.2	60.4	134.7
YA11	IPROG	10	175	37	43	52	55	87	52.8	13.3	39.6	66.1
YA12	ITSPROJ	14	185	40	50	58	64	93	59.5	13.5	46.0	72.9
YA13	ITSANALY	16	190	46	56	63	69	95	64.6	12.4	52.2	77.0
YA14	ITSDEVEL	16	190	52	58	61	72	88	64.5	10.4	54.1	74.8
YA15	IDMPROJ	30	225	49	71	88	103	118	86.4	21.2	65.1	107.6
YA16	IDMANALY	30	225	67	82	93	105	112	91.6	14.4	77.2	106.1
YA17	IDMDEVEL	30	225	68	84	90	98	117	91.5	13.9	77.7	105.4
YA18	IIMANALY	30	225	82	100	103	110	118	102.4	10.6	91.8	113.0
YA19	IIMDEVEL	30	225	33	77	94	135	160	102.1	37.1	65.0	139.2
YA21	TPROG	10	175	40	47	57	61	92	56.8	13.9	42.9	70.8
YA22	TTSPROJ	14	185	47	52	65	70	98	64.6	13.9	50.8	78.5
YA23	TTSANALY	16	190	54	57	70	73	99	69.2	12.4	56.7	81.6
YA24	TTSDEVEL	16	190	57	61	67	75	92	69.6	10.3	59.3	80.0
YA25	TDMPROJ	30	225	73	84	97	108	122	96.3	16.5	79.7	112.8
YA26	TDMANALY	30	225	79	87	100	104	116	98.3	11.2	87.1	109.4
YA27	TDMDEVEL	30	225	87	90	95	110	121	99.8	11.7	88.1	111.5
YA28	TIMANALY	30	225	89	92	104	109	117	102.3	8.7	93.5	111.0
YA29	TIMDEVEL	30	225	37	82	99	138	166	107.0	36.8	70.2	143.8
YA31	OPROG	10	175	35	44	51	54	93	52.9	14.9	38.0	67.9
YA32	OTSPROJ	14	185	41	52	59	64	98	60.4	14.4	45.9	74.8
YA33	OTSANALY	16	190	48	57	64	69	99	65.5	12.9	52.6	78.4
YA34	OTSDEVEL	16	190	53	58	62	71	92	65.4	10.7	54.7	76.1
YA35	ODMPROJ	30	225	62	78	89	103	118	90.4	16.8	73.6	107.1
YA36	ODMANALY	30	225	77	86	94	103	113	94.7	10.6	84.1	105.4
YA37	ODMDEVEL	30	225	81	86	90	103	117	94.4	11.4	82.9	105.8
YA38	OIMANALY	30	225	87	103	104	109	118	103.6	9.1	94.6	112.7
YA39	OIMDEVEL	30	225	33	78	94	135	160	102.2	36.9	65.3	139.1

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NUMBER OF CLUSTERS	PRCD										
	0	0	0	0	0	0	1	0	0	1	0
	1	4	3	6	9	2	0	7	5	1	8
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
11	*	*	*	*	*	*	*	*	*	*	*
10	*****		*	*	*	*	*	*	*	*	*
9	*****		*	*****		*	*	*	*	*	*
8	*****	*		*****		*****	*	*	*	*	*
7	*****			*****		*****	*	*	*	*	*
6	*****			*****		*****	*		*****	*	*
5	*****			*****		*****	*		*****	*	*
4	*****			*****		*****	*		*****	*	*
3	*****			*****		*****	*		*****	*	*
2	*****			*****		*****	*		*****	*	*
1	*****			*****		*****	*		*****	*	*

Figure A.5.3-1. Years of Applicable Experience: Cluster Map for 11 Projects

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Table A.5.3-4. Years of Applicable Experience: Summary Statistics for 20 Independent Systems

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
YAO1	DPROG	10	175	24	34	44	59	100	49.0	21.0	28.0	70.0
YAO2	DTSPROJ	14	185	34	43	52	66	102	56.0	18.7	37.3	74.7
YAO3	DTSANALY	16	190	40	48	59	71	103	61.2	17.0	44.2	78.2
YAO4	DTSDEVEL	16	190	45	52	57	71	100	62.3	15.4	46.8	77.7
YAO5	DDMPROJ	30	225	63	72	83	97	113	84.1	13.7	70.4	97.9
YAO6	DDMANALY	30	225	78	81	91	96	110	89.9	9.6	80.3	99.5
YAO7	DDMDEVEL	30	225	74	84	94	101	112	93.0	10.8	82.2	103.9
YAO8	DDMANALY	30	225	83	91	103	110	135	101.7	14.0	87.7	115.7
YAO9	DDMDEVEL	30	225	28	82	128	140	155	111.4	35.9	75.6	147.3
YA11	IPROG	10	175	33	43	49	65	98	54.3	18.0	36.3	72.3
YA12	ITSPROJ	14	185	40	50	56	72	99	60.7	16.3	44.4	77.0
YA13	ITSANALY	16	190	46	55	62	74	98	65.1	15.0	50.2	80.1
YA14	ITSDEVEL	16	190	52	57	63	75	104	66.8	13.5	53.4	80.3
YA15	IDMPROJ	30	225	49	78	86	97	118	86.1	16.0	70.1	102.1
YA16	IDMANALY	30	225	67	81	91	97	112	89.9	11.7	78.2	101.6
YA17	IDMDEVEL	30	225	68	86	95	108	116	95.8	12.7	83.1	108.5
YA18	IIMANALY	30	225	81	83	101	109	120	97.6	13.9	83.8	111.5
YA19	IIMDEVEL	30	225	33	89	131	144	160	115.5	35.2	80.3	150.8
YA21	TPROG	10	175	35	44	57	73	106	61.3	21.3	40.0	82.7
YA22	TTSPROJ	14	185	46	51	64	77	107	67.9	18.9	49.1	86.8
YA23	TTSANALY	16	190	52	56	69	81	105	71.8	16.8	55.0	88.5
YA24	TTSDEVEL	16	190	57	60	70	83	111	73.5	16.1	57.4	89.7
YA25	TDMPROJ	30	225	73	84	90	104	122	93.9	13.4	80.5	107.4
YA26	TDMANALY	30	225	79	88	98	101	116	96.0	9.6	86.4	105.6
YA27	TDMDEVEL	30	225	87	90	105	110	123	102.6	11.6	91.1	114.2
YA28	TIMANALY	30	225	89	91	96	109	120	99.8	10.7	89.1	110.6
YA29	TIMDEVEL	30	225	37	94	135	150	166	120.1	35.1	85.0	155.2
YA31	OPROG	10	175	33	43	50	62	99	54.9	18.6	36.3	73.5
YA32	OTSPROJ	14	185	41	51	58	68	99	61.5	16.5	45.0	78.1
YA33	OTSANALY	16	190	47	56	63	74	99	66.0	14.9	51.1	81.0
YA34	OTSDEVEL	16	190	53	57	62	74	104	67.7	13.7	54.0	81.4
YA35	ODMPROJ	30	225	62	78	87	100	118	88.1	13.0	75.1	101.1
YA36	ODMANALY	30	225	77	85	91	99	113	91.9	9.3	82.6	101.3
YA37	ODMDEVEL	30	225	81	87	98	107	116	97.3	10.9	86.5	108.2
YA38	OIMANALY	30	225	87	88	103	109	120	99.8	12.0	87.8	111.8
YA39	OIMDEVEL	30	225	33	89	131	145	160	115.8	35.4	80.3	151.2

NUMBER OF CLUSTERS	PRCO																			
	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0
	1	4	3	6	9	6	6	5	1	7	7	7	7	7	2	0	7	7	7	8
	0	0	0	1	0	2	3	0	0	1	4	8	5	7	0	0	3	6	2	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
19	*	*	*	*	*	*	*	*	*	*****	*	*	*	*	*	*	*	*	*	*
18	*	*	*	*	*	*	*	*	*	*****	*	*	*	*	*	*	*	*	*	*
17	*****	*	*	*	*	*	*	*	*	*****	*	*	*	*	*	*	*	*	*	*
16	*****	*	*	*	*	*	*	*	*	*****	*	*	*	*	*	*	*	*	*	*
15	*****	*	*	*	*	*	*	*	*	*****	*	*	*	*	*	*	*	*	*	*
14	*****	*	*	*	*	*	*	*	*	*****	*	*	*	*	*	*	*	*	*	*
13	*****	*	*	*	*	*	*	*	*	*****	*	*	*	*	*	*	*	*	*	*
12	*****	*	*	*	*	*	*	*	*	*****	*	*	*	*	*	*	*	*	*	*
11	*****	*	*	*	*	*	*	*	*	*****	*	*	*	*	*	*	*	*	*	*
10	*****	*	*	*	*	*	*	*	*	*****	*	*	*	*	*	*	*	*	*	*
9	*****	*	*	*	*	*	*	*	*	*****	*	*	*	*	*	*	*	*	*	*
8	*****	*	*	*	*	*	*	*	*	*****	*	*	*	*	*	*	*	*	*	*
7	*****	*	*	*	*	*	*	*	*	*****	*	*	*	*	*	*	*	*	*	*
6	*****	*	*	*	*	*	*	*	*	*****	*	*	*	*	*	*	*	*	*	*
5	*****	*	*	*	*	*	*	*	*	*****	*	*	*	*	*	*	*	*	*	*
4	*****	*	*	*	*	*	*	*	*	*****	*	*	*	*	*	*	*	*	*	*
3	*****	*	*	*	*	*	*	*	*	*****	*	*	*	*	*	*	*	*	*	*
2	*****	*	*	*	*	*	*	*	*	*****	*	*	*	*	*	*	*	*	*	*
1	*****	*	*	*	*	*	*	*	*	*****	*	*	*	*	*	*	*	*	*	*

Figure A.5.3-2. Years of Applicable Experience: Cluster Map
for 20 Independent Systems

Table A.5.3-5. Years of Applicable Experience: Summary
Statistics for 9 Large Systems

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
YA01	DPROG	10	175	40	43	45	57	62	48.6	8.1	40.4	56.7
YA02	DTSPROJ	14	185	48	50	54	65	69	56.2	8.0	48.2	64.2
YA03	DTSANALY	16	190	54	58	59	71	72	62.3	6.8	55.6	69.1
YA04	DTSDEVEL	16	190	52	55	58	71	77	61.6	8.8	52.8	70.3
YA05	DDMPROJ	30	225	68	73	92	100	102	87.7	13.3	74.4	100.9
YA06	DDMANALY	30	225	82	90	94	99	105	93.9	6.8	87.0	100.7
YA07	DDMDEVEL	30	225	74	80	89	103	110	91.3	12.6	78.7	104.0
YA08	DIMANALY	30	225	83	96	105	116	135	106.2	15.2	91.0	121.4
YA09	DIMDEVEL	30	225	66	78	90	128	140	98.9	26.6	72.3	125.5
YA11	I PROG	10	175	43	44	50	58	66	51.6	8.0	43.6	59.5
YA12	ITS PROJ	14	185	50	53	56	65	73	58.6	7.8	50.7	66.4
YA13	ITSANALY	16	190	55	59	62	71	74	63.8	6.6	57.1	70.4
YA14	ITSDEVEL	16	190	55	59	59	71	80	63.7	8.3	55.3	72.0
YA15	IDMPROJ	30	225	59	75	88	101	106	86.4	15.7	70.8	102.1
YA16	IDMANALY	30	225	73	82	93	101	109	91.8	11.4	80.3	103.2
YA17	IDMDEVEL	30	225	68	84	92	106	113	91.9	14.6	77.3	106.5
YA18	IIMANALY	30	225	82	95	103	113	118	102.6	11.8	90.7	114.4
YA19	IIMDEVEL	30	225	69	83	94	131	144	103.3	26.4	76.9	129.8
YA21	T PROG	10	175	43	48	56	61	71	55.3	8.6	46.7	64.0
YA22	TTS PROJ	14	185	51	55	65	71	77	63.2	8.9	54.3	72.1
YA23	TTSANALY	16	190	56	61	70	75	79	67.9	7.9	60.0	75.8
YA24	TTSDEVEL	16	190	57	62	67	75	85	68.6	8.9	59.7	77.4
YA25	TDMPROJ	30	225	73	84	97	104	119	95.3	13.6	81.8	108.9
YA26	TDMANALY	30	225	79	91	99	102	113	97.2	9.7	87.5	106.9
YA27	TDMDDEVEL	30	225	87	90	95	113	118	99.6	12.2	87.3	111.8
YA28	TIMANALY	30	225	89	92	102	108	117	101.2	9.3	91.9	110.5
YA29	TIMDEVEL	30	225	76	88	99	135	148	108.2	25.5	82.8	133.7
YA31	OPROG	10	175	43	45	51	57	66	51.8	7.7	44.1	59.5
YA32	OTSPROJ	14	185	50	54	59	66	73	59.4	7.6	51.8	67.0
YA33	OTSANALY	16	190	56	60	64	71	75	64.6	6.4	58.2	71.0
YA34	OTSDEVEL	16	190	57	59	62	72	81	64.7	8.2	56.5	72.8
YA35	ODMPROJ	30	225	71	79	89	101	103	89.9	11.9	78.0	101.7
YA36	ODMANALY	30	225	84	87	94	103	105	94.3	7.7	86.7	102.0
YA37	ODMDEVEL	30	225	81	85	90	107	114	94.4	12.0	82.4	106.5
YA38	OIMANALY	30	225	87	96	104	110	118	103.4	10.1	93.3	113.5
YA39	OIMDEVEL	30	225	70	83	94	131	144	103.4	26.2	77.3	129.6

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	PRCO									
NUMBER OF	0	0	0	0	0	0	1	0	0	
CLUSTERS	1	4	3	6	9	2	0	7	5	
	0	0	0	1	0	0	0	3	0	
	0	0	0	0	0	0	0	0	0	
9	*	*	*	*	*	*	*	*	*	*
8	*****		*	*	*	*	*	*	*	*
7	*****		*	*****		*	*	*	*	*
6	*****		*	*****		*****		*	*	*
5	*****			*****		*****		*	*	*
4	*****			*****		*****		*	*	*
3	*****			*****		*****		*	*	*
2	*****			*****		*****		*	*	*
1	*****			*****		*****		*	*	*

Figure A.5.3-3. Years of Applicable Experience:
Cluster Map for 9 Large Systems

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Table A.5.3-6. Years of Applicable Experience: Summary Statistics for 11 Small Systems

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
YAO1	DPROG	10	175	24	29	36	78	100	49.4	28.0	21.4	77.4
YAO2	DTSPROJ	14	185	34	37	45	78	102	55.8	24.8	31.0	80.6
YAO3	DTSANALY	16	190	40	43	50	82	103	60.3	22.6	37.7	82.9
YAO4	DTSDEVEL	16	190	45	48	55	79	100	62.8	19.7	43.1	82.5
YAO5	DDMPROJ	30	225	63	72	78	86	113	81.3	14.0	67.3	95.3
YAO6	DDMANALY	30	225	78	78	83	96	110	86.6	10.6	76.0	97.2
YAO7	DDMDEVEL	30	225	80	85	94	102	112	94.5	9.5	84.9	104.0
YAO8	DIMANALY	30	225	84	91	91	107	120	98.0	12.4	85.6	110.4
YAO9	DIMDEVEL	30	225	28	85	140	146	155	121.7	40.2	81.5	162.0
YA11	IIPROG	10	175	33	37	48	81	98	56.5	23.5	33.0	80.1
YA12	ITSPROJ	14	185	40	45	55	82	99	62.5	21.2	41.3	83.6
YA13	ITSANALY	16	190	46	50	59	86	98	66.3	19.7	46.6	86.0
YA14	ITSDEVEL	16	190	52	56	65	83	104	69.5	16.5	52.9	86.0
YA15	IDMPROJ	30	225	49	78	86	93	118	85.8	16.9	68.9	102.8
YA16	IDMANALY	30	225	67	79	88	97	112	88.4	12.2	76.2	100.5
YA17	IDMDEVEL	30	225	86	87	100	108	116	99.0	10.5	88.5	109.5
YA18	IIMANALY	30	225	81	82	88	103	120	93.6	14.6	79.0	108.3
YA19	IIMDEVEL	30	225	33	92	144	147	160	125.5	39.4	86.1	165.0
YA21	TIPROG	10	175	35	41	57	92	106	66.3	27.3	39.0	93.5
YA22	TITSPROJ	14	185	46	50	63	98	107	71.8	24.0	47.8	95.8
YA23	TITSANALY	16	190	52	54	67	99	105	74.9	21.5	53.5	96.4
YA24	TITSDEVEL	16	190	57	60	72	92	111	77.6	19.7	57.9	97.4
YA25	TIDMPROJ	30	225	74	83	88	106	122	92.8	13.9	79.0	106.7
YA26	TIDMANALY	30	225	85	86	90	101	116	95.0	9.8	85.2	104.8
YA27	TIDMDEVEL	30	225	88	94	105	109	123	105.2	11.0	94.2	116.2
YA28	TIMANALY	30	225	89	89	92	110	120	98.7	12.1	86.7	110.8
YA29	TIMDEVEL	30	225	37	96	148	151	166	129.8	40.0	89.9	169.8
YA31	OIPROG	10	175	33	35	49	83	99	57.5	24.3	33.1	81.8
YA32	OTSPROJ	14	185	41	45	56	83	99	63.3	21.6	41.7	84.9
YA33	OTSANALY	16	190	47	51	60	87	99	67.3	19.7	47.6	87.0
YA34	OTSDEVEL	16	190	53	56	66	84	104	70.2	17.0	53.2	87.2
YA35	ODMPROJ	30	225	62	78	85	91	118	86.6	14.3	72.3	101.0
YA36	ODMANALY	30	225	77	81	87	97	113	90.0	10.4	79.6	100.4
YA37	ODMDEVEL	30	225	86	90	100	107	116	99.7	9.7	90.0	109.4
YA38	OIMANALY	30	225	87	87	89	106	120	96.8	13.0	83.8	109.8
YA39	OIMDEVEL	30	225	33	91	144	148	160	125.8	39.9	85.9	165.7

ORIGINAL PAGE IS
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	PRCO										
NUMBER OF	0	0	0	0	0	0	0	0	0	1	0
CLUSTERS	6	6	8	7	7	7	7	7	7	1	7
	2	3	0	2	1	4	8	5	7	0	6
	0	0	0	0	0	0	0	0	0	0	0
11	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*	*****	*	*	*	*	*	*
9	*	*	*	*	*****	*	*	*	*	*	*
8	*	*	*	*	*****	*	*	*	*	*	*
7	*	*	*	*	*****	*	*	*	*	*	*
6	*****	*	*	*	*****	*	*	*	*	*	*
5	*****	*	*	*	*****	*	*	*	*	*	*
4	*****	*	*	*	*****	*	*	*	*	*	*
3	*****	*	*	*	*****	*	*	*	*	*	*
2	*****	*	*	*	*****	*	*	*	*	*	*
1	*****	*	*	*	*****	*	*	*	*	*	*

Figure A.5.3-4. Years of Applicable Experience:
Cluster Map for 11 Small Systems

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A.5.4 YEARS OF ENVIRONMENT EXPERIENCE

- <u>X</u> -	Objective	- <u>X</u> -	Subjective
- - -	Absolute	- <u>X</u> -	Relative
- <u>X</u> -	Explicit	- <u>X</u> -	Derived
- <u>X</u> -	Static	- - -	Dynamic
- <u>X</u> -	Predictive	- - -	Explanatory

This category measures the development team's experience in the development environment of the application. These measures are derived from explicit objective data by combining the experience of each team member to form a team value. They are static and predictive because they are computed from data available before the design, implementation, and testing phases. They are dynamic and explanatory in the sense that the values for each phase can be updated to be more accurate as each phase is completed, since the composition of the development team may have changed during a phase. Codes ending in 1, 5, 8, and 9 are unique; the others are derived. The overall measures are derived from the phase measures.

The remainder of this subsection contains tables and figures that describe the Years of Environment Experience measures with brief phrases, raw numbers, simple statistics, and graphics. These tables and figures include

- Descriptions of the measures with code numbers, mnemonic names, acceptable values, and brief phrases (Table A.5.4-1)
- Values of the measures for 25 systems (Table A.5.4-2), where large values indicate more experience
- Summary statistics for 11 projects (Table A.5.4-3)
- Cluster map for 11 projects (Figure A.5.4-1)
- Summary statistics for 20 independent systems (Table A.5.4-4)

- Cluster map for 20 independent systems (Figure A.5.4-2)
- Summary statistics for 9 large systems (Table A.5.4-5)
- Cluster map for 9 large systems (Figure A.5.4-3)
- Summary statistics for 11 small systems (Table A.5.4-6)
- Cluster map for 11 small systems (Figure A.5.4-4)

Table A.5.4-1. Years of Environment Experience: Description of Measures (1 of 3)

Code	Measure	Range		Description
		Low	High	
Design				
YE01	DPROG	000	150	Programmers Technical Staff
YE02	DTSPROJ	005	160	Programmers and Project Managers
YE03	DTSANALY	008	165	Programmers, Project Managers, and Analysis Managers
YE04	DTSDEVEL	008	165	Programmers and Development Managers
Development Management				
YE05	DDMPROJ	025	200	Project
YE06	DDMANALY	025	200	Project and Analysis
YE07	DDMDEVEL	025	200	Development
Interface Management				
YE08	DIMANALY	025	200	Analysis
YE09	DIMDEVEL	025	200	Development
YE10	D	000	000	Not Defined
Implementation				
YE11	IPROG	000	150	Programmers Technical Staff
YE12	ITSPROJ	005	160	Programmers and Project Managers
YE13	ITSANALY	008	165	Programmers, Project Managers, and Analysis Managers
YE14	ITSDEVEL	025	200	Programmers and Development Managers
Development Management				
YE15	IDMPROJ	025	200	Project
YE16	IDMANALY	025	200	Project and Analysis
YE17	IDMDEVEL	025	200	Development

Table A.5.4-1. Years of Applicable Experience: Description of Measures (2 of 3)

Code	Measure	Range		Description
		Low	High	
Implementation (Continued)				
Interface Management				
YE18	IIMANALY	025	200	Analysis
YE19	IIMDEVEL	025	200	Development
YE20	I	000	000	Not Defined
Test				
YE21	TPROG	000	150	Programmers
Technical Staff				
YE22	TTSPROJ	005	160	Programmers and Project Managers
YE23	TTSANALY	008	165	Programmers, Project Managers, and Analysis Managers
YE24	TTSDEVEL	008	165	Programmers and Development Managers
Development Management				
YE25	TDMPROJ	025	200	Project
YE26	TDMANALY	025	200	Project and Analysis
YE27	TDMDEVEL	025	200	Development
Interface Management				
YE28	TIMANALY	025	200	Analysis
YE29	TIMDEVEL	025	200	Development
YE30	T	000	000	Not Defined
Overall				
YE31	OPROG	000	150	Programmers
Technical Staff				
YE32	OTSPROJ	005	160	Programmers and Project Managers
YE33	OTSANALY	008	165	Programmers, Project Managers, and Analysis Managers

Table A.5.4-1. Years of Applicable Experience: Description of Measures (3 of 3)

Code	Measure	Range		Description
		Low	High	
Overall (Continued).				
Technical Staff (Continued)				
YE34	OTSDEVEL	008	165	Programmers and Development Managers
Development Management				
YE35	ODMPROJ	025	200	Project
YE36	ODMANALY	025	200	Project and Analysis
YE37	ODMDEVEL	025	200	Development
Interface Management				
YE38	OIMANALY	025	200	Analysis
YE39	OIMDEVEL	025	200	Development
YE40	O	000	000	Not Defined

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Table A.5.4-2. Years of Environment Experience: Values
of the Measures for 25 Systems (1 of 2)

PRCO	YE01	YE02	YE03	YE04	YE05	YE06	YE07	YE08	YE09
0100	24	28	30	31	41	42	47	44	59
0200	26	32	35	40	59	57	75	52	106
0300	24	28	30	34	47	43	59	36	83
0400	23	28	29	32	49	45	55	36	67
0500	30	32	37	41	41	51	65	71	115
0600	27	31	33	36	48	45	58	41	78
0700	19	24	25	35	47	40	72	25	123
0800	44	47	47	44	60	53	42	41	18
0900	30	33	34	30	44	43	53	41	70
1000	28	31	32	38	45	44	61	41	92
1100	22	25	27	36	37	39	71	43	138
9000	27	31	32	37	44	43	59	41	90
0610	27	31	32	36	48	45	58	41	78
0620	16	20	21	26	35	33	49	29	78
0630	37	41	41	44	57	50	60	36	67
0631	44	46	43	48	55	49	65	36	85
0632	38	43	43	45	63	54	63	36	63
0710	15	19	20	30	35	32	64	25	123
0720	46	46	44	54	46	40	72	25	123
0730	19	23	24	34	38	34	66	25	123
0740	6	11	16	26	31	29	62	25	123
0750	6	12	13	24	36	30	67	17	129
0760	18	21	22	32	35	32	64	25	123
0770	18	21	22	32	35	32	64	25	123
0780	12	17	19	29	38	38	69	38	131

PRCO	YE11	YE12	YE13	YE14	YE15	YE16	YE17	YE18	YE19
0100	27	30	32	34	44	45	50	47	62
0200	28	35	38	43	63	61	79	56	110
0300	26	28	29	34	36	38	53	40	87
0400	24	30	31	34	54	49	60	39	70
0500	31	34	36	42	44	46	68	51	118
0600	32	36	36	41	52	46	62	34	83
0700	22	27	27	38	50	38	76	15	126
0800	42	46	46	44	65	56	51	39	23
0900	35	35	36	40	36	38	50	40	76
1000	30	31	32	38	36	38	57	40	99
1100	27	27	28	39	27	30	66	34	142
9000	32	33	34	40	36	37	56	40	99
0610	31	35	36	40	52	46	62	34	83
0620	24	27	28	33	42	40	56	36	85
0630	67	66	62	66	60	50	64	28	70
0631	41	44	43	49	57	47	67	28	88
0632	116	106	97	101	66	54	66	28	66
0710	23	27	26	37	41	32	69	14	126
0720	50	50	46	57	50	38	76	15	126
0730	17	22	22	33	41	33	70	15	126
0740	8	13	14	25	34	28	65	14	126
0750	6	12	16	25	37	37	68	37	130
0760	27	31	30	41	46	36	73	15	126
0770	35	37	36	46	43	37	71	24	126
0780	19	25	27	36	50	47	78	40	133

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Table A.5.4-2. Years of Environment Experience: Values
of the Measures for 25 Systems (2 of 2)

PRCO	YE21	YE22	YE23	YE24	YE25	YE26	YE27	YE28	YE29
0100	33	34	35	38	38	39	48	40	69
0200	32	38	39	46	63	58	80	47	114
0300	28	31	33	37	41	43	58	45	92
0400	27	33	35	38	60	55	65	44	76
0500	34	36	37	45	46	45	71	42	120
0600	39	42	41	47	57	47	67	27	87
0700	26	32	33	42	55	49	80	38	131
0800	54	57	56	54	69	60	55	43	27
0900	43	47	47	51	61	56	69	47	84
1000	36	40	41	47	56	53	72	45	104
1100	32	36	36	47	48	46	82	40	149
9000	40	43	44	50	58	54	73	46	103
0610	35	40	39	45	57	47	67	27	87
0620	27	30	31	37	45	40	59	28	88
0630	69	68	64	68	62	52	66	30	72
0631	44	47	45	51	60	50	70	30	90
0632	118	108	99	103	68	56	68	30	68
0710	31	34	35	44	46	43	74	38	131
0720	54	54	52	62	55	49	80	38	131
0730	22	26	28	38	46	43	74	38	131
0740	14	19	22	31	39	39	70	38	131
0750	10	16	19	28	40	40	71	40	133
0760	57	57	56	65	58	52	83	41	134
0770	44	46	46	55	52	48	79	40	133
0780	20	26	28	37	51	48	79	41	134

PRCO	YE31	YE32	YE33	YE34	YE35	YE36	YE37	YE38	YE39
0100	28	31	32	34	41	42	48	43	64
0200	28	35	37	43	62	58	78	52	110
0300	26	29	30	35	41	41	57	41	88
0400	24	30	32	35	54	50	60	40	71
0500	32	34	36	43	43	47	68	55	118
0600	33	36	37	42	52	46	62	34	83
0700	22	28	28	38	51	42	76	26	127
0800	46	50	50	48	64	56	49	41	23
0900	36	38	39	40	47	46	57	43	77
1000	31	34	35	41	46	45	63	42	98
1100	27	29	30	41	38	38	73	39	143
9000	33	36	36	42	46	44	63	42	97
0610	31	35	36	40	52	46	62	34	83
0620	22	26	27	32	41	38	55	31	84
0630	58	58	56	59	60	50	63	32	70
0631	43	46	44	50	57	48	67	31	88
0632	91	86	80	83	66	55	66	32	66
0710	23	27	27	37	41	36	69	26	127
0720	50	50	48	58	50	42	76	26	127
0730	20	24	25	35	42	36	70	26	127
0740	9	14	17	27	35	32	65	26	127
0750	7	13	16	26	37	35	68	32	131
0760	34	36	36	46	46	40	74	27	128
0770	32	35	34	44	43	39	71	30	128
0780	17	23	25	34	46	44	75	40	133

Table A.5.4-3. Years of Environment Experience: Summary Statistics
for 11 Projects

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
YE01	DPROG	0	150	19	23	26	30	44	27.0	6.6	20.4	33.6
YE02	DTSPROJ	5	160	24	28	31	32	47	30.8	6.1	24.7	36.9
YE03	DTSANALY	8	165	25	29	32	35	47	32.6	5.9	26.7	38.6
YE04	DTSDEVEL	8	165	30	32	36	40	44	36.1	4.4	31.7	40.5
YE05	DDMPROJ	25	200	37	41	47	49	60	47.1	7.1	40.0	54.2
YE06	DDMANALY	25	200	39	42	44	51	57	45.6	5.6	40.0	51.3
YE07	DDMDEVEL	25	200	42	53	59	71	75	59.8	10.4	49.4	70.2
YE08	DIMANALY	25	200	25	36	41	44	71	42.8	11.4	31.4	54.2
YE09	DIMDEVEL	25	200	18	67	83	115	138	86.3	33.8	52.5	120.0
YE11	IPROG	0	150	22	26	28	32	42	29.5	5.6	23.9	35.0
YE12	ITSPROJ	5	160	27	28	31	35	46	32.6	5.5	27.1	38.2
YE13	ITSANALY	8	165	27	29	32	36	46	33.7	5.5	28.3	39.2
YE14	ITSDEVEL	8	165	34	34	39	42	44	38.8	3.6	35.2	42.4
YE15	IDMPROJ	25	200	27	36	44	54	65	46.1	12.0	34.1	58.1
YE16	IDMANALY	25	200	30	38	45	49	61	44.1	9.0	35.1	53.1
YE17	IDMDEVEL	25	200	50	51	60	68	79	61.1	10.2	50.9	71.3
YE18	IIMANALY	25	200	15	34	40	47	56	39.5	10.6	28.9	50.1
YE19	IIMDEVEL	25	200	23	70	87	118	142	90.5	33.4	57.1	124.0
YE21	TPROG	0	150	26	28	33	39	54	34.9	8.1	26.8	43.0
YE22	TTSPROJ	5	160	31	33	36	42	57	38.7	7.7	31.0	46.4
YE23	TTSANALY	8	165	33	35	37	41	56	39.4	6.9	32.5	46.3
YE24	TTSDEVEL	8	165	37	38	46	47	54	44.7	5.5	39.2	50.2
YE25	TDMPROJ	25	200	38	46	56	61	69	54.0	9.6	44.4	63.6
YE26	TDMANALY	25	200	39	45	49	56	60	50.1	6.7	43.3	56.8
YE27	TDMDEVEL	25	200	48	58	69	80	82	67.9	10.9	57.0	78.8
YE28	TIMANALY	25	200	27	40	43	45	47	41.6	5.7	36.0	47.3
YE29	TIMDEVEL	25	200	27	76	92	120	149	95.7	33.4	62.4	129.1
YE31	OPROG	0	150	22	26	28	33	46	30.3	6.6	23.7	36.9
YE32	OTSPROJ	5	160	28	29	34	36	50	34.0	6.2	27.8	40.2
YE33	OTSANALY	8	165	28	30	35	37	50	35.1	6.1	29.0	41.1
YE34	OTSDEVEL	8	165	34	35	41	43	48	40.0	4.2	35.8	44.2
YE35	ODMPROJ	25	200	38	41	47	54	64	49.0	8.5	40.5	57.5
YE36	ODMANALY	25	200	38	42	46	50	58	46.5	6.2	40.3	52.6
YE37	ODMDEVEL	25	200	48	57	62	73	78	62.8	10.1	52.7	72.9
YE38	OIMANALY	25	200	26	39	41	43	55	41.5	7.8	33.7	49.2
YE39	OIMDEVEL	25	200	23	71	88	118	143	91.1	33.4	57.7	124.5

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NUMBER OF CLUSTERS	PRCQ										
	0	0	0	1	0	0	0	0	0	0	1
	1	4	3	0	6	9	8	2	5	7	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
11	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*	*****	*	*	*	*	*	*
9	*	*	*****	*****	*****	*	*	*	*	*	*
8	*****	*****	*****	*****	*****	*	*	*	*	*	*
7	*****	*****	*****	*****	*****	*	*	*	*	*	*
6	*****	*****	*****	*****	*****	*	*****	*	*****	*	*
5	*****	*****	*****	*****	*****	*	*****	*****	*****	*****	*
4	*****	*****	*****	*****	*****	*	*****	*****	*****	*****	*****
3	*****	*****	*****	*****	*****	*	*****	*****	*****	*****	*****
2	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
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Figure A.5.4-1. Years of Environment Experience: Cluster Map for 11 Projects

Table A.5.4-4. Years of Environment Experience: Summary Statistics for 20 Independent Systems

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
YE01	DPROG	0	150	6	17	24	30	46	23.5	10.7	12.8	34.3
YE02	DTSPROJ	5	160	11	20	28	32	47	27.3	9.9	17.4	37.2
YE03	DTSANALY	8	165	13	21	30	35	47	28.8	9.3	19.5	38.0
YE04	DTSDEVEL	8	165	24	30	33	40	54	34.6	7.3	27.4	41.9
YE05	DDMPROJ	25	200	31	35	41	48	60	42.8	8.5	34.3	51.4
YE06	DDMANALY	25	200	29	32	41	45	57	40.6	8.2	32.4	48.8
YE07	DDMDEVEL	25	200	42	56	63	67	75	61.1	8.6	52.6	69.7
YE08	DIMANALY	25	200	17	25	36	41	71	35.8	12.2	23.6	48.0
YE09	DIMDEVEL	25	200	18	72	111	123	138	98.4	32.0	66.5	130.4
YE11	IPROG	0	150	6	23	27	34	67	28.8	13.5	15.4	42.3
YE12	ITSPROJ	5	160	12	27	31	35	66	32.0	12.0	20.0	44.1
YE13	ITSANALY	8	165	14	27	32	36	62	32.5	10.7	21.9	43.2
YE14	ITSDEVEL	8	165	25	34	39	43	66	39.3	9.5	29.9	48.8
YE15	IDMPROJ	25	200	27	36	44	52	65	45.0	10.1	35.0	55.1
YE16	IDMANALY	25	200	28	36	38	47	61	41.3	8.6	32.7	49.8
YE17	IDMDEVEL	25	200	50	56	66	71	79	64.3	9.2	55.1	73.5
YE18	IIMANALY	25	200	14	17	37	40	56	32.9	12.9	20.0	45.8
YE19	IIMDEVEL	25	200	23	78	114	126	142	102.2	31.3	70.9	133.5
YE21	TPROG	0	150	10	27	33	44	69	35.1	14.8	20.3	49.9
YE22	TTS PROJ	5	160	16	30	36	47	68	38.4	13.3	25.1	51.7
YE23	TTSANALY	8	165	19	32	37	47	64	38.9	11.7	27.3	50.6
YE24	TTSDEVEL	8	165	28	37	45	53	68	45.6	10.9	34.7	56.6
YE25	TDM PROJ	25	200	38	45	52	60	69	51.6	9.0	42.6	60.7
YE26	TDMANALY	25	200	39	43	48	53	60	47.8	6.5	41.3	54.3
YE27	TDMDEVEL	25	200	48	65	71	79	83	70.1	9.6	60.5	79.7
YE28	TIMANALY	25	200	27	38	40	44	47	39.6	5.6	34.0	45.2
YE29	TIMDEVEL	25	200	27	85	117	133	149	107.0	31.3	75.7	138.3
YE31	OPROG	0	150	7	22	28	34	58	29.0	12.4	16.7	41.4
YE32	OTSPROJ	5	160	13	26	33	36	58	32.5	11.0	21.5	43.6
YE33	OTSANALY	8	165	16	27	33	37	56	33.4	10.0	23.4	43.4
YE34	OTSDEVEL	8	165	26	34	40	44	59	39.9	8.6	31.3	48.5
YE35	ODMPROJ	25	200	35	41	45	52	64	46.4	8.2	38.2	54.7
YE36	ODMANALY	25	200	32	38	42	47	58	43.0	6.9	36.2	49.9
YE37	ODMDEVEL	25	200	48	58	67	73	78	65.0	8.7	56.3	73.8
YE38	OIMANALY	25	200	26	28	37	42	55	36.3	8.6	27.7	44.9
YE39	OIMDEVEL	25	200	23	79	114	128	143	102.8	31.5	71.4	134.3

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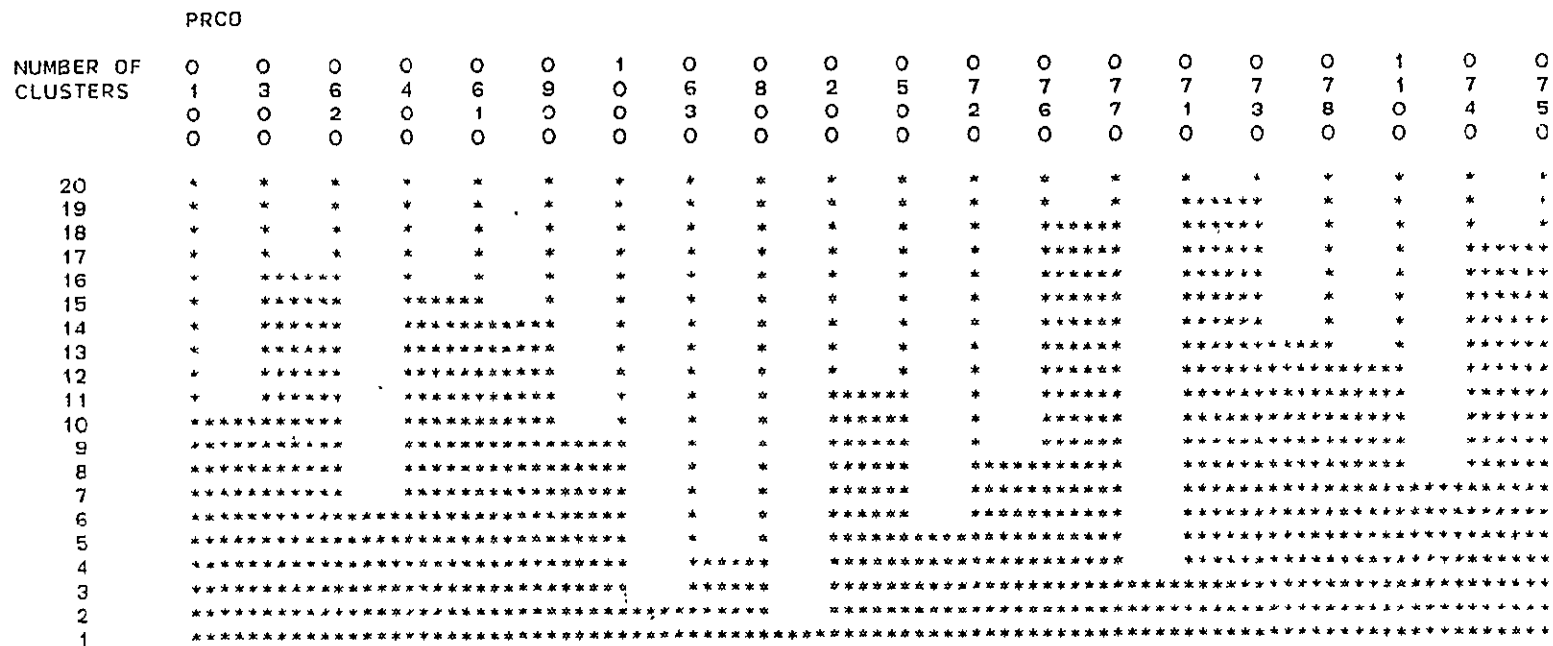


Figure A.5.4-2. Years of Environment Experience: Cluster Map for 20 Independent Systems

Table A.5.4-5. Years of Environment Experience: Summary
Statistics for 9 Large Systems

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
YE01	DPROG	0	150	19	24	26	29	30	25.7	3.6	22.1	29.2
YE02	DTSPROJ	5	160	23	28	31	32	33	29.6	3.1	26.4	32.7
YE03	DTSANALY	8	165	24	30	32	35	37	31.4	3.8	27.6	35.3
YE04	DTSDEVEL	8	165	30	32	34	39	41	35.1	3.9	31.2	39.0
YE05	DDMPROJ	25	200	38	41	45	49	59	45.8	6.1	39.6	51.9
YE06	DDMANALY	25	200	34	43	44	48	57	44.9	6.3	38.6	51.2
YE07	DDMDEVEL	25	200	47	54	59	66	75	59.9	8.2	51.7	68.1
YE08	DIMANALY	25	200	25	36	41	48	71	43.0	12.7	30.3	55.7
YE09	DIMDEVEL	25	200	59	69	83	111	123	88.1	22.4	65.7	110.5
YE11	IPROG	0	150	17	25	28	31	35	27.7	5.1	22.5	32.8
YE12	ITSPROJ	5	160	22	29	31	35	35	31.1	4.3	26.8	35.4
YE13	ITSANALY	8	165	22	30	32	36	38	32.4	4.9	27.5	37.3
YE14	ITSDLEVEL	8	165	33	34	38	41	43	37.6	3.9	33.7	41.4
YE15	IDMPROJ	25	200	36	36	44	53	63	45.1	9.5	35.7	54.6
YE16	IDMANALY	25	200	33	38	45	48	61	43.8	8.3	35.5	52.1
YE17	IDMDEVEL	25	200	50	52	60	69	79	61.0	9.9	51.1	70.9
YE18	IIMANALY	25	200	15	37	40	49	56	40.2	11.7	28.6	51.9
YE19	IIMDEVEL	25	200	62	73	87	114	126	92.3	22.2	70.1	114.6
YE21	TPROG	0	150	22	28	33	36	43	32.2	6.0	26.2	38.3
YE22	TTSPPROJ	5	160	26	32	36	40	47	36.1	6.1	30.0	42.2
YE23	TTSANALY	8	165	28	34	37	40	47	37.1	5.3	31.8	42.5
YE24	TTSDEVEL	8	165	37	38	45	47	51	42.8	5.1	37.7	47.9
YE25	TDMPROJ	25	200	38	44	56	61	63	52.0	9.3	42.7	61.3
YE26	TDMANALY	25	200	39	43	47	56	58	48.8	6.8	41.9	55.6
YE27	TDMDEVEL	25	200	48	62	69	73	80	67.1	9.4	57.7	76.5
YE28	TIMANALY	25	200	27	39	44	46	47	41.7	6.3	35.4	48.0
YE29	TIMDEVEL	25	200	69	80	92	117	131	97.4	21.0	76.4	118.5
YE31	OPROG	0	150	20	25	28	32	36	28.4	4.7	23.7	33.2
YE32	OTSPROJ	5	160	24	30	34	35	38	32.2	4.2	28.0	36.4
YE33	OTSANALY	8	165	25	31	35	37	39	33.6	4.3	29.3	37.8
YE34	OTSDLEVEL	8	165	34	35	40	42	43	38.4	3.7	34.8	42.1
YE35	ODMPROJ	25	200	41	42	46	53	62	47.6	7.2	40.4	54.7
YE36	ODMANALY	25	200	36	42	46	49	58	45.7	6.1	39.5	51.8
YE37	ODMDEVEL	25	200	48	57	62	69	78	62.6	8.7	53.9	71.2
YE38	OIMANALY	25	200	26	37	42	48	55	41.8	8.6	33.1	50.4
YE39	OIMDEVEL	25	200	64	74	88	114	127	92.9	21.8	71.1	114.7

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NUMBER OF CLUSTERS	PRCO									
	0	0	0	0	0	1	0	0	0	
	1	4	6	9	3	0	2	5	7	
	0	0	1	0	0	0	0	0	3	
	0	0	0	0	0	0	0	0	0	
9	*	*	*	*	*	*	*	*	*	*
8	*	*****	*	*	*	*	*	*	*	*
7	*	*****	*	*****	*	*	*	*	*	*
6	*	*****	*	*****	*	*	*	*	*	*
5	*	*****	*	*****	*	*	*	*	*	*
4	*	*****	*	*****	*	*	*	*	*	*
3	*	*****	*	*****	*	*	*	*	*	*
2	*	*****	*	*****	*	*	*	*	*	*
1	*	*****	*	*****	*	*	*	*	*	*

Figure A.5.4-3. Years of Environment Experience:
Cluster Map for 9 Large Systems

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Table A.5.4-6. Years of Environment Experience: Summary Statistics
for 11 Small Systems

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
YE01	DPROG	0	150	6	12	18	37	46	21.8	14.2	7.6	36.0
YE02	DTSPROJ	5	160	11	17	21	41	47	25.5	13.0	12.4	38.5
YE03	DTSANALY	8	165	13	19	22	41	47	26.5	11.8	14.7	38.4
YE04	DTSDEVEL	8	165	24	26	32	44	54	34.3	9.4	24.9	43.7
YE05	DDMPROJ	25	200	31	35	36	46	60	40.5	9.7	30.8	50.1
YE06	DDMANALY	25	200	29	32	33	40	53	37.1	8.0	29.1	45.1
YE07	DDMDEVEL	25	200	42	60	64	69	72	62.2	9.2	53.0	71.3
YE08	DIMANALY	25	200	17	25	25	38	43	29.9	8.3	21.6	38.2
YE09	DIMDEVEL	25	200	18	78	123	129	138	106.9	37.0	69.9	143.9
YE11	IPROG	0	150	6	19	27	42	67	29.8	17.9	11.9	47.8
YE12	ITSPROJ	5	160	12	25	27	46	66	32.8	16.1	16.8	48.9
YE13	ITSANALY	8	165	14	26	28	46	62	32.6	14.1	18.6	46.7
YE14	ITSDEVEL	8	165	25	33	39	46	66	40.8	12.4	28.4	53.2
YE15	IDMPROJ	25	200	27	37	43	50	65	45.0	11.0	34.0	56.0
YE16	IDMANALY	25	200	28	32	37	47	56	39.2	8.6	30.6	47.8
YE17	IDMDEVEL	25	200	51	64	68	73	78	67.0	8.1	58.9	75.1
YE18	IIMANALY	25	200	14	15	28	37	40	26.9	10.9	16.1	37.8
YE19	IIMDEVEL	25	200	23	85	126	130	142	110.3	36.1	74.2	146.4
YE21	TPROG	0	150	10	20	32	54	69	37.5	19.4	18.1	56.8
YE22	TTSPROJ	5	160	16	26	36	57	68	40.3	17.2	23.1	57.5
YE23	TTSANALY	8	165	19	28	36	56	64	40.5	15.2	25.3	55.6
YE24	TTSDEVEL	8	165	28	37	47	62	68	48.0	13.8	34.2	61.8
YE25	TDMPROJ	25	200	39	45	51	58	69	51.4	9.2	42.2	60.6
YE26	TDMANALY	25	200	39	40	48	52	60	47.0	6.4	40.6	53.4
YE27	TDMDEVEL	25	200	55	66	74	80	83	72.5	9.4	63.2	81.9
YE28	TIMANALY	25	200	28	38	40	41	43	37.9	4.7	33.2	42.6
YE29	TIMDEVEL	25	200	27	88	131	134	149	114.8	36.9	77.9	151.7
YE31	OPROG	0	150	7	17	27	46	58	29.5	16.5	13.1	46.0
YE32	OTSPROJ	5	160	13	23	29	50	58	32.8	14.8	18.1	47.6
YE33	OTSANALY	8	165	16	25	30	48	56	33.3	13.2	20.1	46.5
YE34	OTSDEVEL	8	165	26	32	41	48	59	41.1	11.2	29.9	52.3
YE35	ODMPROJ	25	200	35	38	43	50	64	45.5	9.3	36.3	54.8
YE36	ODMANALY	25	200	32	36	39	44	56	40.9	6.9	34.0	47.8
YE37	ODMDEVEL	25	200	49	63	69	74	76	67.1	8.6	58.5	75.7
YE38	OIMANALY	25	200	26	26	31	39	41	31.8	5.8	26.1	37.6
YE39	OIMDEVEL	25	200	23	84	127	131	143	111.0	36.6	74.4	147.6

	PRCO										
NUMBER OF CLUSTERS	0	0	0	1	0	0	0	0	0	0	0
	6	7	7	1	7	7	7	7	7	6	8
	2	1	8	0	4	5	2	6	7	3	0
	0	0	0	0	0	0	0	0	0	0	0
11	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*	*	*	*	*****	*	*	*
9	*	*	*	*	*****	*	*****	*	*	*	*
8	*	*****	*	*****	*	*****	*	*****	*	*	*
7	*	*****	*****	*****	*	*****	*	*****	*	*	*
6	*	*****	*****	*****	*****	*****	*****	*****	*	*	*
5	*	*****	*****	*****	*****	*****	*****	*****	*	*	*
4	*	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
3	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
2	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****

Figure A.5.4-4. Years of Environment Experience:
Cluster Map for 11 Small Systems

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A.6 MODELS CLASS OF MEASURES

The Models class measures all four components of software development, i.e., the problem, the environment, the process, and the product. Most of the measures in this class exist in one of the other classes because the models require the measures to be in a form inconvenient for SEL use or scaled differently than the SEL prefers. The measures in this class, some with minor adjustments, comprise the input for the following models:

- IBM's Walston-Felix (WF01 through WF80)
 - Experience (WF01 through WF10)
 - Complexity (WF11 through WF30)
 - Process (WF31 through WF60)
 - Product (WF61 through WF80)
 - Sums (WF81 and WF82)
- RCA's PRICE S3 (PS01 through PS20)
 - Process (PS01 through PS09)
 - Complexity (PS10 through PS13)
 - Product (PS14 through PS17)
 - Other (PS18 through PS20)
 - Sum (PS81)
- TRW's Boehm's COCOMO (CO01 through CO15)
 - Product (CO01 through CO03)
 - Computer (CO04 through CO07)
 - Personnel (CO08 through CO12)
 - Project (CO13 through CO15)

A.6.1 WALSTON-FELIX MODEL

- <u>X</u> -	Objective	- - -	Subjective
- <u>X</u> -	Absolute	- - -	Relative
- <u>X</u> -	Explicit	- - -	Derived
- <u>X</u> -	Static	- - -	Dynamic
- - -	Predictive	- <u>X</u> -	Explanatory

This category measures all four components of software development. The experience (WF01 through WF10) and the complexity (WF11 through WF30) subcategories of measures are subjective in the manner in which they are scaled and the interpretation of the scale values, although objective data are needed to determine values. Both subcategories are predictive: fairly good estimates of the experience measures can be obtained at the beginning of a project, and estimates of the complexity measures improve from the beginning of the project until implementation starts. Both subcategories become static during implementation.

Most of the measures in the process (WF31 through WF60) and the product (WF61 through WF80) subcategories are objective and are computed from explicit and absolute data. Therefore, they are static and explanatory at the end of the project. However, to use the model, estimates (dynamic) of the measures must be made for prediction.

The remainder of this subsection contains tables and figures that describe the Walston-Felix measures with brief phrases, raw numbers, simple statistics, and graphics. These tables and figures include

- Descriptions of the measures with code numbers, mnemonic names, acceptable values, and brief phrases (Table A.6.1-1)
- Values of the measures for 25 systems (Table A.6.1-2), where for the subjective experience and complexity measures large values indicate more experience and more complexity
- Summary statistics for 11 projects (Table A.6.1-3)
- Cluster map for 11 projects (Figure A.6.1-1)
- Summary statistics for 20 independent systems (Table A.6.1-4)

- Cluster map for 20 independent systems (Figure A.6.1-2)
- Summary statistics for 9 large systems (Table A.6.1-5)
- Cluster map for 9 large systems (Figure A.6.1-3)
- Summary statistics for 11 small systems (Table A.6.1-6)
- Cluster map for 11 small systems (Figure A.6.1-4)

Table A.6.1-1. Walston-Felix: Description of Measures
(1 of 4)

Code	Measure	Range		Description
		Low	High	
WF01	EAPPLICA	00	50	Experience With Application
WF02	EREQDEF	00	50	Participation in Requirements Definition
WF03	EPPDESGN	00	99	Percentage of Programmers in Design
				Programmers'
WF04	EPQUALFX	00	60	Qualifications
WF05	EPMACHIN	00	50	Familiarity With Machine
WF06	EPLANGE	00	50	Familiarity With Language
WF07	EPGRAPHX	00	50	Familiarity With Graphics
WF08	EPAPPLIC	00	50	Familiarity With Application
WF09	EPTOGETH	00	50	Degree to Which Personnel Worked Together
WF10	E	00	00	Not Defined
WF11	CREQDEF	00	50	Participation in Requirements Definition
				Customer—
WF12	CINTERFC	00	50	Interface
WF13	CDCHANGS	00	60	Originated Design Changes
WF14	CPROCESS	00	50	Application Processing
WF15	CFLOW	00	50	Program Flow
				Communications
WF16	CPROGCOM	00	50	Interprogram
WF17	CEXTCOM	00	50	External
WF18	CDBSTRUC	00	50	Data Base Structure
WF19	CGRAPHX	00	50	Percentage of Code, Real-Time or Graphics
				Constraint
WF20	CSTORAGE	00	50	Storage
WF21	CTIMING	00	50	Timing
WF22	CIO	00	50	Input/Output

Table A.6.1-1. Walston-Felix: Description of Measures
(2 of 4)

Code	Measure	Range		Description
		Low	High	
WF23	CDBITEMS	00	99	Items in Data Base
WF24	CHW	00	50	Hardware Under Development
WF25	CCLASIFD	00	50	Unclassified
WF26	C	00	00	Not Defined
WF27	C	00	00	Not Defined
WF28	C	00	00	Not Defined
WF29	C	00	00	Not Defined
WF30	C	00	00	Not Defined
Percentage of				
WF31	PDEV95	000	999	Development on IBM S/360/95
WF32	PDEV75	000	999	Development on IBM S/360-75
WF33	PDEVSTL	000	999	Development at STL
WF34	PPPDESGN	000	999	Programmers in Design
WF35	PTOGETHR	000	999	Previous Personnel Interac- tions
WF36	PECLOSED	000	050	Environment Closed
WF37	PEOPENWR	000	999	Environment Open With Respect
WF38	PEOPEN	000	999	Environment Open
WF39	PERJE	000	999	Environment RJE
WF40	PETSO	000	999	Environment TSO
WF41	PCSTRUC	000	999	Code Structured
WF42	PCREAD	000	999	Code Read
WF43	PCTOPDWN	000	999	Code Developed Top-Down
WF44	PCCHIEF	000	999	Code via Chief Programmer
WF45	PEMANAGE	000	250	Effort, Management
WF46	PEADMIN	000	100	Effort, Administration
WF47	PEPROG	000	950	Effort, Programmers
WF48	PEANALYT	000	950	Effort, Analysts

Table A.6.1-1. Walston-Felix: Description of Measures
(3 of 4)

Code	Measure	Range		Description
		Low	High	
				Percentage of
WF49	PEOPER	000	333	Effort, Operators
WF50	PEOTHERS	000	250	Effort, Others
				Total
WF51	PTOTALHR	00000	96000	Staff-Months
WF52	PCOSTPHR	00000	99999	Cost in Programmer Units
WF53	P	000	000	Not Defined
WF54	PPSCHACC	450	999	Percentage of Schedule To Complete Acceptance Testing (Actual Workweeks)
WF55	PTWEEKS	016	104	Total Weeks To Complete Project (Workweeks)
WF56	P	000	000	Not Defined
WF57	P	000	000	Not Defined
WF58	P	000	000	Not Defined
WF59	P	000	000	Not Defined
WF60	P	000	000	Not Defined
				Percentage of
WF61	DCNONMTH	000	999	Code, Nonmathematical and I/O Formatting
WF62	DCMATH	000	500	Code, Mathematical and Computational
WF63	DCIOCNTL	000	250	Code, CPU and I/O Control
WF64	DCRECOVR	000	100	Code, Fallback and Re- covery
WF65	DCOTHER	000	999	Code, Other
WF66	DCGRAPHX	000	625	Code, Real-Time or Graphics
				Developed Lines
WF67	DDVLOL	000000	060000	ALC (assembler)
WF68	DDVMOL	000000	060000	Macros

Table A.6.1-1. Walston-Felix: Description of Measures
(4 of 4)

Code	Measure	Range		Description
		Low	High	
Developed Lines (Continued).				
WF69	DDVHOL	000000	240000	FORTTRAN
WF70	DDVTOT	000000	240000.	Total
Delivered Lines				
WF71	DDLLOL	000000	060000	ALC
WF72	DDLMOl	000000	060000	Macros
WF73	DDLHOL	000000	240000	FORTTRAN
WF74	DDLTOT	000000	240000	Total
WF75	DDBITEMS	0000	2000	Items in Data Base
WF76	DDOCPAGE	0000	9999	Pages of Documentation
WF77	D	0000	0000	Not Defined
WF78	D	0000	0000	Not Defined
WF79	D	0000	0000	Not Defined
WF80	D	0000	0000	Not Defined
WF81	EXPERIEN	000	509	Sum WF01 Through WF09
WF82	COMPLEX	000	809	Sum WF11 Through WF25

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Table A.6.1-2. Walston-Felix: Values of the Measures
for 25 Systems (1 of 4)

PRC0	WFO1	WFO2	WFO3	WFO4	WFO5	WFO6	WFO7	WFO8	WFO9	WF81
0100	50	50	75	40	30	50	50	30	10	385
0200	50	50	70	20	30	50	30	30	10	340
0300	50	50	71	40	30	50	50	30	10	381
0400	50	50	75	20	30	50	30	30	30	365
0500	50	50	99	50	30	50	50	30	30	439
0600	50	50	55	40	30	50	50	30	10	365
0700	50	50	55	20	30	50	30	30	10	325
0800	50	30	33	60	50	50	50	50	10	383
0900	50	30	80	10	30	50	30	10	10	300
1000	50	30	71	30	30	50	50	30	10	351
1100	50	50	99	40	30	50	50	30	10	409
9000	50	30	78	20	30	50	40	25	10	333
0610	50	50	67	40	30	50	50	30	10	377
0620	50	50	95	40	30	50	50	30	10	405
0630	50	50	67	40	45	50	50	35	25	412
0631	50	50	50	40	50	50	50	50	30	420
0632	50	50	99	20	30	50	40	10	10	359
0710	50	50	50	40	30	50	50	30	10	360
0720	50	50	99	60	50	50	50	50	10	469
0730	50	50	50	40	50	50	50	50	10	400
0740	50	50	75	10	10	30	30	10	10	275
0750	50	50	50	20	30	50	10	10	10	280
0760	50	50	99	50	30	50	50	30	10	419
0770	50	50	50	40	50	50	50	50	10	400
0780	50	50	50	20	30	50	10	20	10	290

PRC0	WF11	WF12	WF13	WF14	WF15	WF16	WF17	WF18	WF19	WF20
0100	10	40	20	30	30	30	30	30	20	50
0200	10	40	20	30	30	30	30	30	20	50
0300	10	30	20	30	30	30	30	50	30	50
0400	10	30	40	50	50	50	30	50	10	50
0500	10	30	40	30	30	30	30	30	20	50
0600	10	50	60	50	50	50	30	50	40	50
0700	10	30	40	50	50	50	30	50	20	30
0800	30	30	40	30	30	30	30	50	0	50
0900	30	30	40	50	30	30	30	30	30	30
1000	30	30	40	50	50	50	30	50	30	30
1100	10	30	40	30	30	30	30	30	40	50
9000	30	30	40	50	30	30	30	40	30	30
0610	10	50	60	50	50	50	30	50	40	50
0620	10	30	40	30	30	30	30	30	40	30
0630	10	40	50	30	30	30	30	30	40	30
0631	10	50	60	30	30	30	30	30	50	30
0632	10	30	20	30	30	30	30	30	10	10
0710	10	30	40	50	30	30	30	50	30	50
0720	10	30	20	30	30	30	30	30	40	30
0730	10	30	40	50	30	50	30	50	30	30
0740	10	30	0	30	30	30	30	30	10	30
0750	10	30	60	30	30	30	30	30	20	10
0760	10	30	0	30	30	30	30	30	30	30
0770	10	30	20	30	30	30	30	30	0	10
0780	10	50	40	30	30	30	30	30	20	30

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Table A.6.1-2. Walston-Felix: Values of the Measures
for 25 Systems (2 of 4)

PRCO	WF21	WF22	WF23	WF24	WF25	WF82
0100	30	30	15	0	0	365
0200	30	30	7	0	0	357
0300	30	30	19	0	0	389
0400	50	50	26	0	0	496
0500	30	30	7	0	0	367
0600	30	30	73	0	0	573
0700	30	30	28	0	0	448
0800	30	30	11	0	0	391
0900	30	50	8	0	0	418
1000	50	50	11	0	0	501
1100	30	30	5	0	0	385
9000	40	50	24	0	0	454
0610	30	30	60	0	0	560
0620	30	10	19	0	0	359
0630	30	10	15	0	0	375
0631	30	10	14	0	0	404
0632	30	10	2	0	0	272
0710	30	30	11	0	0	421
0720	30	30	9	0	0	349
0730	30	50	11	0	0	441
0740	30	10	8	0	0	278
0750	30	30	8	0	0	348
0760	30	10	3	0	0	293
0770	30	10	4	0	0	264
0780	30	10	4	0	0	344

PRCO	WF31	WF32	WF33	WF34	WF35	WF36	WF37	WF38	WF39	WF40
0100	666	334	0	750	250	17	317	0	666	0
0200	485	515	0	700	200	26	489	0	436	49
0300	576	424	0	714	286	29	395	0	461	115
0400	503	497	0	750	875	25	472	0	302	201
0500	527	471	2	999	800	24	449	0	527	0
0600	585	370	45	545	182	19	351	45	526	59
0700	384	616	0	545	273	30	586	0	216	168
0800	990	10	0	333	0	0	10	0	990	0
0900	648	352	0	800	200	17	335	0	454	194
1000	631	369	0	710	714	18	351	0	315	316
1100	425	575	0	950	999	29	546	0	0	425
9000	619	381	0	775	636	19	362	0	327	292
0610	596	404	0	667	222	20	384	0	536	60
0620	950	50	0	950	999	3	47	0	855	95
0630	198	516	286	667	200	25	491	286	121	77
0631	100	900	0	500	333	45	855	0	90	10
0632	320	40	640	999	999	2	38	640	160	160
0710	419	581	0	500	999	29	552	0	210	209
0720	250	750	0	999	999	38	712	0	250	0
0730	223	777	0	500	0	39	738	0	167	56
0740	999	1	0	750	0	0	0	0	250	750
0750	608	392	0	500	0	20	372	0	304	304
0760	77	923	0	999	999	46	877	0	77	0
0770	999	1	0	500	999	0	0	0	500	500
0780	934	66	0	500	0	3	63	0	700	234

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Table A.6.1-2. Walston-Felix: Values of the Measures
for 25 Systems (3 of 4)

PRCD	WF41	WF42	WF43	WF44	WF45	WF46	WF47	WF48	WF49	WF50
0100	600	650	800	900	125	20	640	0	0	215
0200	500	100	200	750	120	20	777	0	0	83
0300	400	300	200	500	246	30	643	0	0	81
0400	650	100	200	400	196	30	696	0	0	78
0500	750	950	600	950	206	30	607	0	0	157
0600	650	800	800	850	142	21	678	0	0	159
0700	600	250	700	500	145	20	722	0	0	113
0800	900	500	800	999	153	77	559	0	0	211
0900	750	100	200	400	171	43	661	0	0	125
1000	750	300	400	650	175	44	618	0	0	163
1100	750	100	600	999	178	44	643	0	0	135
9000	750	200	300	500	173	44	640	0	0	143
0610	650	850	800	850	140	19	681	0	0	160
0620	500	100	800	999	158	26	615	0	0	201
0630	750	800	800	900	134	29	709	0	0	128
0631	750	999	900	999	158	39	630	0	0	173
0632	750	500	800	750	70	0	927	0	0	3
0710	700	200	800	900	168	27	702	0	0	103
0720	750	0	800	999	79	7	783	0	0	131
0730	550	300	600	850	159	16	713	0	0	102
0740	600	100	400	999	155	33	645	0	0	167
0750	750	0	800	999	188	33	625	0	0	154
0760	750	800	400	800	94	8	797	0	0	101
0770	750	0	600	900	202	64	603	0	0	131
0780	750	200	800	999	115	6	767	0	0	112

PRCD	WF51	WF52	WF54	WF55
0100	11582	11176	831	83
0200	9600	9875	758	66
0300	7902	8671	905	63
0400	9080	9749	844	64
0500	3964	4120	864	44
0600	13829	13849	938	81
0700	9836	10090	900	70
0800	3266	3296	918	61
0900	10628	11098	947	94
1000	10604	10898	943	88
1100	2769	2888	934	76
9000	24002	24885	947	94
0610	9874	9866	938	81
0620	1563	1550	897	68
0630	2392	2434	878	41
0631	1758	1780	878	41
0632	633	654	561	41
0710	1892	1980	814	70
0720	1033	1010	902	61
0730	2848	2966	857	70
0740	696	703	816	49
0750	1298	932	476	63
0760	732	732	895	38
0770	496	529	999	48
0780	840	844	720	25

Table A.6.1-2. Walston-Felix: Values of the Measures
for 25 Systems (4 of 4)

PRCO	WF61	WF62	WF63	WF64	WF65	WF66	WF67	WF68	WF69	WF70
0100	523	316	111	50	0	277	1736	9343	79077	90156
0200	515	328	107	50	0	267	507	5925	39780	46212
0300	598	190	162	50	0	405	962	6254	39243	46459
0400	631	240	79	50	0	197	3049	5952	45530	54531
0500	544	319	87	50	0	217	489	3422	27233	31144
0600	511	260	179	50	0	447	774	19214	80784	100772
0700	565	270	115	50	0	287	506	10287	56670	67463
0800	370	480	100	50	0	0	5	0	14945	14950
0900	502	328	120	50	0	300	247	6703	42519	49469
1000	504	317	129	50	0	322	330	8129	40509	48968
1100	571	214	165	50	0	412	280	2846	8986	12112
9000	518	303	129	50	0	322	857	17678	92014	110550
0610	549	220	181	50	0	452	676	15284	62620	78580
0620	277	480	193	50	0	482	0	1960	7776	9736
0630	466	323	161	50	0	402	98	1970	10388	12456
0631	248	480	222	50	0	555	98	1618	5180	6896
0632	878	10	62	50	0	155	0	352	5208	5560
0710	800	10	140	50	0	350	355	2074	10325	12754
0720	409	390	151	50	0	377	0	2155	8356	10511
0730	533	290	127	50	0	317	113	4177	17219	21509
0740	890	10	50	50	0	100	38	0	3022	3060
0750	519	330	101	50	0	252	0	457	3776	4233
0760	324	480	146	50	0	365	0	1424	6401	7825
0770	420	480	50	50	0	0	0	0	2052	2052
0780	840	10	100	50	0	200	0	0	4978	4978

PRCO	WF71	WF72	WF73	WF74	WF75	WF76
0100	2970	12417	96481	111868	290	2473
0200	1157	5925	48155	55237	138	1104
0300	2016	8270	42641	50911	380	1613
0400	14682	5952	54759	75393	529	1793
0500	1683	6524	67213	75420	145	1120
0600	1778	19790	88738	110306	1455	3017
0700	1594	10287	77632	89513	553	2695
0800	26	0	15232	15258	218	763
0900	1233	8086	58006	67325	165	2107
1000	1649	8543	56074	66266	219	2360
1100	685	2846	13740	17271	93	760
9000	3567	19475	127820	150862	477	5227
0610	1290	15447	68632	85399	1208	2458
0620	0	1966	8206	10172	372	255
0630	488	2370	11900	14758	299	366
0631	488	2025	6613	9126	284	300
0632	0	352	5287	5639	40	66
0710	841	2074	11948	14863	222	527
0720	0	2155	12127	14282	185	511
0730	564	4177	28081	32822	225	873
0740	189	0	5308	5497	161	136
0750	0	457	4068	4525	155	214
0760	0	1424	8303	9727	54	284
0770	0	0	2052	2052	78	61
0780	0	0	5204	5204	82	163

Table A.6.1-3. Walston-Felix: Summary Statistics for 11 Projects (1 of 2)

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
WFO1	EAPPLICA	0	50	50	50	50	50	50	50.0	0.0	50.0	50.0
WFO2	EREQDEF	0	50	30	30	50	50	50	44.5	9.3	35.2	53.9
WFO3	EPPDESGN	0	99	33	55	71	80	99	71.2	19.1	52.1	90.3
WFO4	EPQUALFX	0	60	10	20	40	40	60	33.6	15.0	18.6	48.7
WFO5	EPMACHIN	0	50	30	30	30	30	50	31.8	6.0	25.8	37.8
WFO6	EPLANGE	0	50	50	50	50	50	50	50.0	0.0	50.0	50.0
WFO7	EPGRAPHX	0	50	30	30	50	50	50	42.7	10.1	32.6	52.8
WFO8	EPAPPLIC	0	50	10	30	30	30	50	30.0	8.9	21.1	38.9
WFO9	EPTOGETH	0	50	10	10	10	10	30	13.6	8.1	5.5	21.7
WF11	CREQDEF	0	50	10	10	10	30	30	15.5	9.3	6.1	24.8
WF12	CINTERFC	0	50	30	30	30	40	50	33.6	6.7	26.9	40.4
WF13	CDCHANGS	0	60	20	20	40	40	60	36.4	12.1	24.3	48.4
WF14	CPROCESS	0	50	30	30	30	50	50	39.1	10.4	28.6	49.5
WF15	CFLOW	0	50	30	30	30	50	50	37.3	10.1	27.2	47.4
WF16	CPROGCOM	0	50	30	30	30	50	50	37.3	10.1	27.2	47.4
WF17	CEXTCOM	0	50	30	30	30	30	30	30.0	0.0	30.0	30.0
WF18	CDBSTRUC	0	50	30	30	50	50	50	40.9	10.4	30.5	51.4
WF19	CGRAPHX	0	50	0	20	20	30	40	23.6	12.1	11.6	35.7
WF20	CSTORAGE	0	50	30	30	50	50	50	44.5	9.3	35.2	53.9
WF21	CTIMING	0	50	30	30	30	30	50	33.6	8.1	25.5	41.7
WF22	CIO	0	50	30	30	30	50	50	35.5	9.3	26.1	44.8
WF23	CDBITEMS	0	99	5	7	11	26	73	19.1	19.5	-0.4	38.6
WF24	CHW	0	50	0	0	0	0	0	0.0	0.0	0.0	0.0
WF25	CCLASIFD	0	50	0	0	0	0	0	0.0	0.0	0.0	0.0
WF31	PDEV95	0	999	384	485	576	648	990	583.6	162.1	421.5	745.8
WF32	PDEV75	0	999	10	352	424	515	616	412.1	162.6	249.4	574.7
WF33	PDEVSTL	0	999	0	0	0	0	45	4.3	13.5	-9.2	17.8
WF34	PPPDESGN	0	999	333	545	714	800	999	708.7	186.8	521.9	895.6
WF35	PTOGETHR	0	999	0	200	273	800	999	434.5	341.9	92.5	776.4
WF36	PECLOSED	0	50	0	17	24	29	30	21.3	8.6	12.6	29.9
WF37	PEOPENWR	0	999	10	335	395	489	586	391.0	154.5	236.5	545.5
WF38	PEOPEN	0	999	0	0	0	0	45	4.1	13.6	-9.5	17.7
WF39	PERJE	0	999	0	302	454	527	990	444.8	254.4	190.4	699.3
WF40	PETSO	0	999	0	0	115	201	425	138.8	139.2	-0.4	278.1
WF41	PCSTRUC	0	999	400	600	650	750	900	663.6	138.0	525.6	801.6
WF42	PCREAD	0	999	100	100	300	650	950	377.3	305.3	72.0	682.5
WF43	PCTOPDWN	0	999	200	200	600	800	800	500.0	264.6	235.4	764.6
WF44	PCCHIEF	0	999	400	500	750	950	999	718.0	237.7	480.3	955.7
WF45	PEMANAGE	0	250	120	142	171	196	246	168.8	37.5	131.3	206.3
WF46	PEADMIN	0	100	20	20	30	44	77	34.5	17.1	17.3	51.6
WF47	PEPROG	0	950	559	618	643	696	777	658.5	59.1	599.5	717.6
WF48	PEANALYT	0	950	0	0	0	0	0	0.0	0.0	0.0	0.0
WF49	PEOPER	0	333	0	0	0	0	0	0.0	0.0	0.0	0.0
WF50	PEOTHERS	0	250	78	83	135	163	215	138.2	48.3	89.8	186.5
WF51	PTOTALHR	0	96000	2769	3964	9600	10628	13829	8460.0	3624.1	4835.9	12084.1

Table A.6.1-3. Walston-Felix: Summary Statistics for 11 Projects (2 of 2)

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
WF52	PCOSTPHR	0	99999	2888	4120	9875	11098	13849	8700.9	3627.6	5073.3	12328.5
WF54	PPSCHACC	450	999	758	844	905	938	947	889.3	59.2	830.0	948.5
WF55	PTWEEKS	16	104	44	63	70	83	94	71.8	14.3	57.5	86.1
WF61	DCNONMTH	0	999	370	504	523	571	631	530.4	67.5	462.8	597.9
WF62	DCMATH	0	500	190	240	316	328	480	296.5	77.7	218.9	374.2
WF63	DCIOCNTL	0	250	79	100	115	162	179	123.1	32.7	90.4	155.8
WF64	DCRECOVR	0	100	50	50	50	50	50	50.0	0.0	50.0	50.0
WF65	DCOTHER	0	999	0	0	0	0	0	0.0	0.0	0.0	0.0
WF66	DCGRAPHX	0	625	0	217	287	405	447	284.6	123.4	161.2	408.1
WF67	DDVL0L	0	60000	5	280	506	962	3049	807.7	875.1	-67.4	1682.9
WF68	DDVM0L	0	60000	0	3422	6254	9343	19214	7097.7	4986.0	2111.7	12083.7
WF69	DDVH0L	0	240000	8986	27233	40509	56670	80784	43206.9	22683.8	20523.1	65890.7
WF70	DDVT0T	0	240000	12112	31144	48968	67463	100772	51112.4	27477.2	23635.2	78589.6
WF71	DDL0L	0	60000	26	1157	1649	2016	14682	2679.4	4050.4	-1371.1	6729.8
WF72	DDL0L	0	60000	0	5925	8086	10287	19790	8058.2	5151.0	2907.2	13209.1
WF73	DDLH0L	0	240000	13740	42641	56074	77632	96481	56242.8	26451.9	29790.9	82694.7
WF74	DDL0T	0	240000	15258	50911	67325	89513	111868	66797.1	31755.9	35041.2	98552.9
WF75	DDBITEMS	0	2000	93	145	219	529	1455	380.5	388.6	-8.2	769.1
WF76	DDOCPAGE	0	9999	760	1104	1793	2473	3017	1800.5	792.6	1007.9	2593.0
WF81	EXPERIEN	0	509	300	340	365	385	439	367.5	38.7	328.9	406.2
WF82	COMPLEX	0	809	357	367	391	496	573	426.4	69.9	356.4	496.3

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	PRCD										
NUMBER OF	0	0	0	0	0	0	0	1	0	0	1
CLUSTERS	1	6	7	2	3	4	9	0	5	8	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
11	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*	*	*	*	*	*	*	*
9	*	*	*	*	*	*	*	*	*	*	*
8	*	*	*	*	*	*	*	*	*	*	*
7	*	*	*	*	*	*	*	*	*	*	*
6	*	*	*	*	*	*	*	*	*	*	*
5	*	*	*	*	*	*	*	*	*	*	*
4	*	*	*	*	*	*	*	*	*	*	*
3	*	*	*	*	*	*	*	*	*	*	*
2	*	*	*	*	*	*	*	*	*	*	*
1	*	*	*	*	*	*	*	*	*	*	*

Figure A.6.1-1. Walston-Felix: Cluster Map for 11 Projects

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Table A.6.1-4. Walston-Felix: Summary Statistics for 20 Independent Systems
(1 of 2)

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
WFO1	EAPPLICA	0	50	50	50	50	50	50	50.0	0.0	50.0	50.0
WFO2	EREQDEF	0	50	30	50	50	50	50	47.0	7.3	39.7	54.3
WFO3	EPPDESGN	0	99	33	50	71	91	99	71.3	19.9	51.4	91.1
WFO4	EPQUALFX	0	60	10	20	40	40	60	35.5	14.7	20.8	50.2
WFO5	EPMACHIN	0	50	10	30	30	41	50	33.8	10.1	23.6	43.9
WFO6	EPLANGE	0	50	30	50	50	50	50	49.0	4.5	44.5	53.5
WFO7	EPGRAPHX	0	50	10	30	50	50	50	42.0	13.6	28.4	55.6
WFO8	EPAPPLIC	0	50	10	30	30	34	50	30.8	12.4	18.4	43.1
WFO9	EPTOGETH	0	50	10	10	10	10	30	12.8	6.8	6.0	19.5
WF11	CREQDEF	0	50	10	10	10	10	30	13.0	7.3	5.7	20.3
WF12	CINTERFC	0	50	30	30	30	38	50	33.5	6.7	26.8	40.2
WF13	CDCHANGS	0	60	0	20	40	40	60	33.5	16.6	16.9	50.1
WF14	CPROCESS	0	50	30	30	30	50	50	36.0	9.4	26.6	45.4
WF15	CFLOW	0	50	30	30	30	30	50	33.0	7.3	25.7	40.3
WF16	CPRGCOM	0	50	30	30	30	30	50	34.0	8.2	25.8	42.2
WF17	CEXTCOM	0	50	30	30	30	30	30	30.0	0.0	30.0	30.0
WF18	CDBSTRUC	0	50	30	30	30	50	50	37.0	9.8	27.2	46.8
WF19	CGRAPHX	0	50	0	20	30	38	40	25.0	12.8	12.2	37.8
WF20	CSTORAGE	0	50	10	30	30	50	50	37.0	13.4	23.6	50.4
WF21	CTIMING	0	50	30	30	30	30	50	32.0	6.2	25.8	38.2
WF22	CIO	0	50	10	10	30	30	50	28.0	14.4	13.6	42.4
WF23	CDBITEMS	0	99	3	7	10	15	60	13.0	12.5	0.6	25.5
WF24	CHW	0	50	0	0	0	0	0	0.0	0.0	0.0	0.0
WF25	CCLASIFD	0	50	0	0	0	0	0	0.0	0.0	0.0	0.0
WF31	PDEV95	0	999	77	421	586	867	999	585.2	280.9	304.3	866.1
WF32	PDEV75	0	999	1	133	414	560	923	400.4	267.1	133.3	667.5
WF33	PDEVSTL	0	999	0	0	0	0	286	14.4	63.9	-49.5	78.3
WF34	PPPDESGN	0	999	333	500	712	913	999	711.9	198.0	513.9	909.9
WF35	PTOGETHR	0	999	0	50	268	999	999	487.0	427.5	59.5	914.6
WF36	PECLOSED	0	50	0	7	22	29	46	20.4	13.6	6.8	34.0
WF37	PEOPENWR	0	999	0	127	390	532	877	380.0	253.8	126.2	633.8
WF38	PEOPEN	0	999	0	0	0	0	286	14.3	64.0	-49.7	78.3
WF39	PERJE	0	999	0	220	376	534	990	406.0	258.7	147.4	664.7
WF40	PETSO	0	999	0	12	105	287	750	179.3	199.5	-20.3	378.8
WF41	PCSTRUC	0	999	400	600	750	750	900	677.5	119.7	557.8	797.2
WF42	PCREAD	0	999	0	100	200	613	950	322.5	316.8	5.7	639.3
WF43	PCTOPDWN	0	999	200	400	600	800	800	580.0	241.9	338.1	821.9
WF44	PCCHIEF	0	999	400	763	900	999	999	837.1	199.0	638.2	1036.1
WF45	PEMANAGE	0	250	79	127	163	186	246	158.6	40.4	118.2	199.0
WF46	PEADMIN	0	100	6	19	30	41	77	30.3	17.9	12.4	48.2
WF47	PEPROG	0	950	559	620	653	712	797	674.2	67.4	606.8	741.6
WF48	PEANALYT	0	950	0	0	0	0	0	0.0	0.0	0.0	0.0
WF49	PEOPER	0	333	0	0	0	0	0	0.0	0.0	0.0	0.0
WF50	PEOTHERS	0	250	78	102	131	162	215	136.9	41.4	95.5	178.3
WF51	PTOTALHR	0	96000	496	1099	2809	9470	11582	4652.9	4102.1	550.9	8755.0
WF52	PCOSTPHR	0	99999	529	952	2927	9837	11176	4765.8	4222.7	543.2	8988.5

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Table A.6.1-4. Walston-Felix: Summary Statistics for 20 Independent Systems (2 of 2)

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
WF54	PPSCHACC	450	999	476	820	887	930	999	856.8	111.9	744.9	968.7
WF55	PTWEEKS	16	104	25	48	64	75	94	62.6	17.7	44.9	80.4
WF61	DCNONMTII	0	999	277	432	521	591	890	539.3	158.7	380.5	698.0
WF62	DCMATH	0	500	10	216	318	375	480	287.8	148.8	139.0	436.5
WF63	DCIOCNTL	0	250	50	100	124	159	193	123.0	40.1	82.9	163.1
WF64	DCRECDVR	0	100	50	50	50	50	50	50.0	0.0	50.0	50.0
WF65	DCOTHER	0	999	0	0	0	0	0	0.0	0.0	0.0	0.0
WF66	DCGRAPHX	0	625	0	204	309	396	482	284.7	135.8	148.9	420.5
WF67	DDVL0L	0	60000	0	0	180	503	3049	444.3	748.3	-304.1	1192.6
WF68	DDVMOL	0	60000	0	699	2501	6179	15284	3903.8	3926.5	-22.7	7830.2
WF69	DDVHOL	0	240000	2052	6745	12667	40327	79077	23736.8	22160.2	1576.5	45897.0
WF70	DDVTOT	0	240000	2052	8303	13852	48341	90156	28084.8	26241.7	1843.1	54326.4
WF71	DDLLOL	0	60000	0	0	625	1559	14682	1473.6	3218.8	-1745.2	4692.5
WF72	DDLMOL	0	60000	0	699	2608	7696	15447	4431.6	4389.4	42.3	8821.0
WF73	DDLHOL	0	240000	2052	8230	14486	55745	96481	30906.5	28032.0	2874.5	58938.5
WF74	DDLTOT	0	240000	2052	9838	16265	67060	111868	36712.5	33499.1	3213.4	70211.6
WF75	DDBITEMS	0	2000	54	140	202	297	1208	260.9	251.9	9.0	512.8
WF76	DDOCPAGE	0	9999	61	262	762	1748	2473	997.0	840.1	157.0	1897.1
WF81	EXPERIEN	0	509	275	343	382	408	469	372.0	53.1	318.9	425.1
WF82	COMPLEX	0	809	264	348	371	420	560	385.0	73.7	311.4	458.7

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	PRCO																			
NUMBER OF CLUSTERS	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0
	1	6	2	3	4	9	0	5	6	7	7	7	7	6	7	7	1	8	7	
	0	1	0	0	0	0	0	0	2	6	4	5	8	3	1	2	0	0	3	
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
20	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
19	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
18	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
17	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
16	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
15	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
14	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
13	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
12	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
11	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
9	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
8	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
7	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
6	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
5	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
4	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
3	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
1	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

Figure A.6.1-2. Walston-Felix: Cluster Map for 20 Independent Systems

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Table A.6.1-2 Summary Statistics for 9 Large
Systems (1 of 2)

CODE	NAME	LOW	3RD Q	HIGH	AVERAGE	STD DEV	AVG-SD	AVG+SD
CODE	NAME	LOW	3RD Q	HIGH	AVERAGE	STD DEV	AVG-SD	AVG+SD
0000	0000	50	50	50	50.0	0.0	50.0	50.0
0001	0001	50	50	50	45.6	8.8	56.7	54.4
0002	0002	78	99	73	73.1	12.8	60.3	85.9
0003	0003	40	50	32	32.2	13.0	49.2	45.2
0004	0004	30	50	32	32.2	6.7	35.6	38.9
0005	0005	50	50	50	50.0	0.0	50.0	50.0
0006	0006	50	50	43	43.3	10.0	53.3	53.3
0007	0007	50	50	30	30.0	10.0	40.0	40.0
0008	0008	50	30	14	14.4	8.8	23.3	23.3
0009	0009	50	30	14	14.4	8.8	23.3	23.3
0010	0010	10	30	40	34.4	7.3	27.2	41.7
0011	0011	10	60	35	35.6	13.3	48.9	48.9
0012	0012	50	50	41	41.1	10.5	51.7	51.7
0013	0013	50	50	36	36.7	10.0	46.7	46.7
0014	0014	20	50	38	38.9	10.5	49.4	49.4
0015	0015	30	30	30	30.0	0.0	30.0	30.0
0016	0016	30	50	41	41.1	10.5	51.7	51.7
0017	0017	30	40	25	25.6	8.8	34.4	34.4
0018	0018	30	50	43	43.3	10.0	53.3	53.3
0019	0019	30	40	34	34.4	8.8	43.3	43.3
0020	0020	30	50	38	38.9	10.5	49.4	49.4
0021	0021	30	60	18	18.2	16.9	35.1	35.1
0022	0022	30	0	0	0.0	0.0	0.0	0.0
0023	0023	30	0	0	0.0	0.0	0.0	0.0
0024	0024	30	0	0	0.0	0.0	0.0	0.0
0025	0025	60	666	539	539.4	134.8	404.7	674.2
0026	0026	506	777	460	460.3	134.7	325.6	595.1
0027	0027	0	2	0	0.2	0.7	0.4	0.9
0028	0028	75	999	732	732.2	130.6	601.6	862.8
0029	0029	994	757	394	394.1	314.5	79.6	708.6
0030	0030	38	39	23	23.9	7.1	31.0	31.0
0031	0031	50	738	436	436.7	128.2	308.5	564.8
0032	0032	0	0	0	0.0	0.0	0.0	0.0
0033	0033	532	666	429	429.3	148.6	280.7	577.9
0034	0034	317	110	110	110.1	106.7	3.4	216.8
0035	0035	750	750	622	622.2	122.8	499.4	745.0
0036	0036	750	950	405	405.6	329.2	76.3	734.8
0037	0037	700	800	444	444.4	260.3	184.1	704.8
0038	0038	875	950	694	694.4	215.7	478.7	910.1
0039	0039	201	246	172	172.0	40.6	131.4	212.6
0040	0040	37	44	28	28.0	10.3	17.7	38.3
0041	0041	705	777	670	670.7	53.0	617.7	723.7
0042	0042	0	0	0	0.0	0.0	0.0	0.0
0043	0043	0	0	0	0.0	0.0	0.0	0.0
0044	0044	162	215	129	129.3	47.5	81.8	176.8
0045	0045	106	11582	8453	8453.6	3056.7	5396.9	11510.2
0046	0046	10998	11176	8713	8713.2	3049.7	5663.5	11763.0
0047	0047	2848	5931	3600	3600.0	0.0	3600.0	3600.0
0048	0048	2936	6196	3606	3606.0	0.0	3606.0	3606.0

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Table A.6.1-5. Walston-Felix: Summary Statistics for 9 Large Systems (2 of 2)

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
WF54	PPSCHACC	450	999	758	838	864	941	947	876.3	62.9	813.4	939.3
WF55	PTWEEKS	16	104	44	64	70	86	94	72.6	15.4	57.1	88.0
WF61	DCNONMTH	0	999	502	510	533	574	631	544.3	43.7	500.6	588.0
WF62	DCMATH	0	500	190	230	316	324	328	283.1	52.6	230.5	335.7
WF63	DCIOCNIL	0	250	79	97	120	146	181	122.6	32.7	89.8	155.3
WF64	DCRECOVR	0	100	50	50	50	50	50	50.0	0.0	50.0	50.0
WF65	DCOTHER	0	999	0	0	0	0	0	0.0	0.0	0.0	0.0
WF66	DCGRAPHX	0	625	197	242	300	364	452	306.0	81.9	224.1	387.9
WF67	DDVL0L	0	60000	113	289	507	1349	3049	901.0	939.8	-38.8	1840.8
WF68	DDVMOL	0	60000	3422	5051	6254	8736	15284	7243.2	3509.4	3733.8	10752.6
WF69	DDVHOL	0	240000	17219	33238	40509	54075	79077	43747.8	18138.5	25609.3	61886.3
WF70	DDVTOT	0	240000	21509	38678	48968	66556	90156	51892.0	21251.9	30640.1	73143.9
WF71	DDL0L	0	60000	564	1195	1649	2493	14682	3027.1	4421.1	-1394.0	7448.2
WF72	DDLMOI	0	60000	4177	5939	8086	10480	15447	8371.2	3524.8	4846.4	11896.1
WF73	DDLHOL	0	240000	28081	45398	56074	67923	96481	57782.4	19106.5	38676.0	76888.9
WF74	DDLTOT	0	240000	32822	53074	67325	80410	111868	68960.1	22428.8	46531.3	91389.0
WF75	DDBITEMS	0	2000	138	155	225	455	1208	366.6	339.9	26.7	706.4
WF76	DDOCPAGE	0	9999	873	1112	1793	2409	2473	1766.8	625.0	1141.8	2391.8
WF81	EXPERIEN	0	509	300	346	377	393	439	370.9	39.1	331.8	410.0
WF82	COMPLEX	0	809	357	366	418	499	560	432.7	72.2	360.5	504.9

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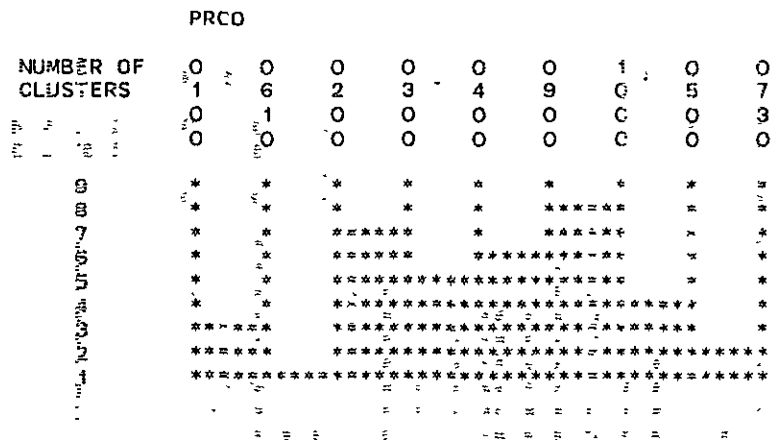


Figure A.6.1-3, Walston-Felix: Cluster Map for 9 Large Systems

Table A.6.1-6. Walston-Felix: Summary Statistics for 11 Small Systems (1 of 2)

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
WFO1	EAPPLICA	0	50	50	50	50	50	50	50.0	0.0	50.0	50.0
WFO2	EREQDEF	0	50	30	50	50	50	50	48.2	6.0	42.2	54.2
WFO3	EPPDESGN	0	99	33	50	67	99	99	69.7	24.8	44.9	94.5
WFO4	EPQUALFX	0	60	10	20	40	50	60	38.2	16.0	22.2	54.2
WFO5	EPMACHIN	0	50	10	30	30	50	50	35.0	12.4	22.6	47.4
WFO6	EPLANGE	0	50	30	50	50	50	50	48.2	6.0	42.2	54.2
WFO7	EPGRAPHX	0	50	10	30	50	50	50	40.9	16.4	24.5	57.3
WFO8	EPAPPLIC	0	50	10	20	30	50	50	31.4	14.5	16.9	45.9
WFO9	EPTOGETH	0	50	10	10	10	10	25	11.4	4.5	6.8	15.9
WF11	CREQDEF	0	50	10	10	10	10	30	11.8	6.0	5.8	17.8
WF12	CINTERFC	0	50	30	30	30	30	50	32.7	6.5	26.3	39.2
WF13	CDCHANGS	0	60	0	20	40	40	60	31.8	19.4	12.4	51.2
WF14	CPROCESS	0	50	30	30	30	30	50	31.8	6.0	25.8	37.8
WF15	CFLOW	0	50	30	30	30	30	30	30.0	0.0	30.0	30.0
WF16	CPRGCOM	0	50	30	30	30	30	30	30.0	0.0	30.0	30.0
WF17	CEXTCOM	0	50	30	30	30	30	30	30.0	0.0	30.0	30.0
WF18	CDBSTRUC	0	50	30	30	30	30	50	33.6	8.1	25.5	41.7
WF19	CGRAPHX	0	50	0	10	30	40	40	24.5	15.7	8.8	40.3
WF20	CSTORAGE	0	50	10	30	30	50	50	31.8	14.0	17.8	45.8
WF21	CTIMING	0	50	30	30	30	30	30	30.0	0.0	30.0	30.0
WF22	CIO	0	50	10	10	10	30	30	19.1	10.4	8.6	29.5
WF23	CDBITEMS	0	99	3	4	8	11	19	8.8	5.0	3.8	13.8
WF24	CHW	0	50	0	0	0	0	0	0.0	0.0	0.0	0.0
WF25	CCLASIFD	0	50	0	0	0	0	0	0.0	0.0	0.0	0.0
WF31	PDEV95	0	999	77	250	608	990	999	622.6	363.3	259.3	986.0
WF32	PDEV75	0	999	1	10	392	581	923	351.4	339.3	12.0	690.7
WF33	PDEVSTL	0	999	0	0	0	0	286	26.0	86.2	-60.2	112.2
WF34	PPPDESGN	0	999	333	500	667	950	999	695.3	245.3	449.9	940.6
WF35	PTOGETHR	0	999	0	0	999	999	999	563.1	504.0	59.1	1067.1
WF36	PECLOSED	0	50	0	0	20	29	46	17.5	17.0	0.5	34.6
WF37	PEOPENWR	0	999	0	10	372	552	877	333.6	322.5	11.1	656.2
WF38	PEOPEN	0	999	0	0	0	0	286	26.0	86.2	-60.2	112.2
WF39	PERJE	0	999	0	121	250	700	990	387.0	329.5	57.5	716.5
WF40	PETSO	0	999	0	0	209	425	750	235.8	242.3	-6.5	478.1
WF41	PCSTRUC	0	999	500	700	750	750	900	722.7	100.9	621.8	823.6
WF42	PCREAD	0	999	0	0	100	500	800	254.5	304.5	-50.0	559.1
WF43	PCTOPDWN	0	999	400	600	800	800	800	690.9	164.0	526.9	854.9
WF44	PCCHIEF	0	999	800	900	999	999	999	953.9	68.3	885.6	1022.2
WF45	PEMANAGE	0	250	79	115	155	178	202	147.6	38.7	109.0	186.3
WF46	PEADMIN	0	100	6	8	29	44	77	32.2	22.7	9.5	54.9
WF47	PEPROG	0	950	559	615	645	767	797	677.1	79.7	597.4	756.8
WF48	PEANALYT	0	950	0	0	0	0	0	0.0	0.0	0.0	0.0
WF49	PEOPER	0	333	0	0	0	0	0	0.0	0.0	0.0	0.0
WF50	PEOTHERS	0	250	101	112	131	167	211	143.1	36.9	106.2	180.0
WF51	PTOTALHR	0	96000	496	732	1298	2392	3266	1543.4	927.4	616.0	2470.8
WF52	PCOSTPHR	0	99999	529	732	1010	2434	3296	1536.2	969.7	566.4	2505.9

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Table A.6.1-6. Walston-Felix: Summary Statistics for 11 Small Systems (2 of 2)

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
WF54	PPSCHACC	450	999	476	814	895	918	999	840.8	141.4	699.4	982.2
WF55	PTWEEKS	16	104	25	41	61	68	76	54.5	15.6	38.9	70.2
WF61	DCNONMTH	0	999	277	370	466	800	890	535.1	215.2	319.9	750.3
WF62	DCMATH	0	500	10	10	330	480	480	291.5	199.5	92.0	491.1
WF63	DCIOCNTL	0	250	50	100	140	161	193	123.4	46.8	76.6	170.2
WF64	DCRECOVR	0	100	50	50	50	50	50	50.0	0.0	50.0	50.0
WF65	DCOTHER	0	999	0	0	0	0	0	0.0	0.0	0.0	0.0
WF66	DCGRAPHX	0	625	0	100	350	402	482	267.3	170.1	97.2	437.3
WF67	DDVL0L	0	60000	0	0	0	98	355	70.5	126.8	-56.2	197.3
WF68	DDVM0L	0	60000	0	0	1424	2074	2846	1171.5	1091.3	80.2	2262.7
WF69	DDVH0L	0	240000	2052	3776	7776	10325	14945	7364.1	3817.5	3546.6	11181.6
WF70	DDVTOT	0	240000	2052	4233	9736	12456	14950	8606.1	4428.1	4178.0	13034.2
WF71	DDL0L	0	60000	0	0	0	488	841	202.6	316.1	-113.5	518.8
WF72	DDL0L	0	60000	0	0	1424	2155	2846	1208.4	1127.0	81.3	2335.4
WF73	DDL0L	0	240000	2052	5204	8303	12127	15232	8917.1	4357.3	4559.7	13274.4
WF74	DDL0L	0	240000	2052	5204	10172	14863	17271	10328.1	5296.1	5032.0	15624.1
WF75	DOBITEMS	0	2000	54	82	161	222	372	174.5	99.2	75.3	273.6
WF76	DDOCPAGE	0	9999	61	163	284	527	763	367.3	242.7	124.6	610.0
WF81	EXPERIEN	0	509	275	290	400	412	469	372.9	64.3	308.6	437.2
WF82	COMPLEX	0	809	264	293	349	385	421	346.1	49.4	296.7	395.4

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	PRCO										
NUMBER OF	0	0	0	0	0	0	0	0	0	1	0
CLUSTERS	6	7	7	7	7	7	6	7	7	1	8
	2	6	4	5	8	7	3	1	2	0	0
	0	0	0	0	0	0	0	0	0	0	0
11	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*	*	*	*****	*	*	*	*
9	*	*	*	*****	*	*	*****	*	*	*	*
8	*	*	*****	*****	*	*	*****	*	*	*	*
7	*****	*****	*****	*****	*	*	*****	*	*	*	*
6	*****	*****	*****	*****	*	*	*****	*	*	*	*
5	*****	*****	*****	*****	*	*	*****	*	*	*	*
4	*****	*****	*****	*****	*****	*****	*****	*	*	*	*
3	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
2	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****

Figure A.6.1-4. Walston-Felix: Cluster Map
for 11 Small Systems

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A.6.2 PRICE S3 MODEL

<u>X</u>	Objective				Subjective
<u>X</u>	Absolute				Relative
<u>X</u>	Explicit				Derived
<u>X</u>	Static				Dynamic
	Predictive		<u>X</u>		Explanatory

This category measures all four components of software development. All the measures are objective, absolute, explicit, static, and explanatory at the end of the project. However, estimates (dynamic) of the measures must be made for prediction. A certain number of measures become static as each phase of development is completed.

The remainder of this subsection contains tables and figures that describe the PRICE S3 measures with brief phrases, raw numbers, simple statistics, and graphics. These tables and figures include

- Descriptions of the measures with code numbers, mnemonic names, acceptable values, and brief phrases (Table A.6.2-1)
- Values of the measures for 25 systems (Table A.6.2-2)
- Summary statistics for 11 projects (Table A.6.2-3)
- Cluster map for 11 projects (Figure A.6.2-1)
- Summary statistics for 20 independent systems (Table A.6.2-4)
- Cluster map for 20 independent systems (Figure A.6.2-2)
- Summary statistics for 9 large systems (Table A.6.2-5)
- Cluster map for 9 large systems (Figure A.6.2-3)

- Summary statistics for 11 small systems (Table A.6.2-6)
- Cluster map for 11 small systems (Figure A.6.2-4)

Table A.6.2-1. PRICE S3: Description of Measures (1 of 2)

Code	Measure	Range		Description
		Low	High	
Percentage of Schedule				
PS01	DESGPHAS	200	500	Design Phase (From Start)
PS02	DESGACT	200	800	Design Activity (From Start)
PS03	CODEPHAS	150	500	Coding Phase (From Design Phase)
PS04	CODEACT	150	600	Coding Activity (From Design Phase)
PS05	TESTPHAS	100	500	Test Phase (From Coding Phase)
PS06	TESTACT	100	800	Test Activity (From Documentation Phase)
PS07	SDOCPHAS	050	300	System Documentation Phase (From End)
PS08	SDOCACT	250	600	Documentation Activity (From End)
PS09	SCH67	0239	1552	Ratio of Actual Schedule to 67-Week Schedule
Complexity Factor				
PS10	CMPLXTOT	060	240	Total
PS11	CMPXPERS	080	120	Personnel Only
PS12	CMPXPROD	080	120	Product Only
PS13	CMPXEXTR	100	200	External Effects Only
PS14	NEWDESGN	000	999	New Design - Percentage of Code in Wholly New Components
PS15	NEWCODE	000	999	New Code - Percentage of Code in New and Extensively Modified Components
PS16	NEWTEST	000	999	New Test - Percentage of Code in New or Modified Components
PS17	APLICATN	086	999	Application - Instruction Mix
PS18	RESOURCE	100	400	Resource - Skill Mix and Experience for Cost
PS19	UTILITY	065	100	Utility - Fraction of Storage and Timing Capacity

Table A.6.2-1. PRICE S3: Description of Measures (2 of 2)

<u>Code</u>	<u>Measure</u>	<u>Range</u>		<u>Description</u>
		<u>Low</u>	<u>High</u>	
PS20	PLATFORM	060	250	Platform - Strictness of Standards, e.g., MIL-Spec
PS81	CMPLXITY	320	680	Sum PS10 Through PS13

Table A.6.2-2. PRICE S3: Values of the Measures for
25 Systems

PRC0	PS01	PS02	PS03	PS04	PS05	PS06	PS07	PS08	PS09	PS10
0100	229	627	398	506	217	614	157	572	1239	110
0200	318	636	318	379	121	439	242	523	985	120
0300	254	667	413	556	238	651	95	540	940	90
0400	266	641	375	453	203	578	156	547	955	130
0500	364	682	318	409	182	500	136	477	657	100
0600	296	593	296	407	346	642	62	556	1209	150
0700	286	629	343	471	271	614	100	543	1045	90
0800	459	787	328	393	131	459	82	377	910	70
0900	340	787	447	489	160	606	53	436	1403	80
1000	364	739	375	466	205	580	57	449	1313	80
1100	316	776	461	513	158	618	66	454	1134	100
9000	351	734	383	468	213	596	53	457	1403	80
0610	296	593	296	407	346	642	62	556	1209	150
0620	441	662	221	338	221	779	118	522	1015	120
0630	390	634	244	341	244	488	122	488	612	140
0631	390	634	244	341	244	488	122	488	612	130
0632	463	683	220	268	195	415	122	427	612	110
0710	257	571	314	443	271	586	100	529	1045	110
0720	328	721	393	508	164	557	115	475	910	60
0730	286	629	343	471	271	614	100	543	1045	100
0740	367	592	224	408	265	490	143	520	731	100
0750	286	587	302	365	302	603	111	563	940	120
0760	474	658	184	263	158	342	184	434	567	70
0770	375	750	375	438	104	479	146	438	716	80
0780	400	560	160	240	160	320	280	520	373	120

PRC0	PS11	PS12	PS13	PS14	PS15	PS16	PS17	PS18	PS19	PS20	PS81
0100	100	90	120	681	757	936	350	211	80	100	420
0200	110	90	120	654	795	859	350	211	80	100	440
0300	100	90	100	891	891	983	350	211	80	100	380
0400	110	100	120	640	654	710	350	211	80	100	460
0500	100	80	120	153	267	356	350	211	80	100	400
0600	90	100	160	763	892	960	350	211	80	100	500
0700	100	80	110	517	692	852	350	211	80	100	380
0800	80	90	100	975	975	975	350	211	80	100	340
0900	100	80	100	512	668	813	350	211	80	100	360
1000	100	80	100	573	674	804	350	211	80	100	360
1100	100	100	100	627	627	762	350	211	80	100	400
9000	100	80	100	552	666	803	350	211	80	100	360
0610	90	100	160	750	900	966	350	211	80	100	500
0620	90	100	130	911	946	998	350	211	80	100	440
0630	90	100	150	738	805	895	350	211	80	100	480
0631	80	100	150	587	695	840	350	211	80	100	460
0632	110	100	100	982	982	982	350	211	80	100	420
0710	100	90	120	770	822	928	350	211	80	100	420
0720	80	80	100	624	670	732	350	211	80	100	320
0730	100	80	120	306	570	809	350	211	80	100	400
0740	120	80	100	260	446	800	350	211	80	100	400
0750	120	100	100	919	919	919	350	211	80	100	440
0760	90	80	100	290	756	967	350	211	80	100	340
0770	100	80	100	999	999	999	350	211	80	100	360
0780	100	100	120	946	946	946	350	211	80	100	440

Table A.6.2-3. PRICE S3: Summary Statistics for 11 Projects

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
PS01	DESGPHAS	200	500	229	266	316	364	459	317.5	63.9	253.6	381.4
PS02	DESGACT	200	800	593	629	667	776	787	687.6	71.8	615.8	759.4
PS03	CODEPHAS	150	500	296	318	375	413	461	370.2	55.0	315.2	425.2
PS04	CODEACT	150	600	379	407	466	506	556	458.4	56.2	402.1	514.6
PS05	TESTPHAS	100	500	121	158	203	238	346	202.9	65.4	137.5	268.3
PS06	TESTACT	100	800	439	500	606	618	651	572.8	73.3	499.6	646.1
PS07	SDOCPHAS	50	300	53	62	95	156	242	109.6	58.2	51.5	167.8
PS08	SDOCACT	250	600	377	449	523	547	572	497.6	62.4	435.3	560.0
PS09	SCH67	239	1552	657	940	1045	1239	1403	1071.8	213.5	858.3	1285.4
PS10	CMPLXTOT	60	240	70	80	100	120	150	101.8	24.0	77.8	125.8
PS11	CMPXPERS	80	120	80	100	100	100	110	99.1	8.3	90.8	107.4
PS12	CMPXPROD	80	120	80	80	90	100	100	89.1	8.3	80.8	97.4
PS13	CMPXEXTR	100	200	100	100	110	120	160	113.6	18.0	95.6	131.7
PS14	NEWDESGN	0	999	153	517	640	763	975	635.1	215.7	419.4	850.8
PS15	NEWCODE	0	999	267	654	692	891	975	717.5	188.3	529.1	905.8
PS16	NEWTST	0	999	356	762	852	960	983	819.1	178.1	641.0	997.2
PS17	APLICATN	86	999	350	350	350	350	350	350.0	0.0	350.0	350.0
PS18	RESOURCE	100	400	211	211	211	211	211	211.0	0.0	211.0	211.0
PS19	UTILITY	65	100	80	80	80	80	80	80.0	0.0	80.0	80.0
PS20	PLATFORM	60	250	100	100	100	100	100	100.0	0.0	100.0	100.0
PS81	CMPLXITY	320	680	340	360	400	440	500	403.6	48.0	355.6	451.7

	PRCO										
NUMBER OF CLUSTERS	0	0	0	0	0	0	1	0	0	1	0
	1	6	3	2	4	7	1	8	9	0	5
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
11	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*	*	*	*	*	*****	*	*
9	*	*	*	*	*****	*	*	*	*****	*	*
8	*****	*	*	*	*****	*	*	*	*****	*	*
7	*****	*	*	*	*****	*	*	*	*****	*	*
6	*****	*	*	*	*****	*	*	*	*****	*	*
5	*****	*	*	*	*****	*	*	*	*****	*	*
4	*****	*	*	*	*****	*	*	*	*****	*	*
3	*****	*	*	*	*****	*	*	*	*****	*	*
2	*****	*	*	*	*****	*	*	*	*****	*	*
1	*****	*	*	*	*****	*	*	*	*****	*	*

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Figure A.6.2-1. PRICE S3: Cluster Map for 11 Projects

Table A.6.2-4. PRICE S3: Summary Statistics for 20 Independent Systems

CODE	NAME	--ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
PS01	DESGPHAS	200	500	229	286	334	386	474	340.5	69.8	270.7	410.3
PS02	DESGACT	200	800	560	602	650	735	787	664.9	72.5	592.5	737.4
PS03	CODEPHAS	150	500	160	257	323	389	461	324.4	84.3	240.1	408.8
PS04	CODEACT	150	600	240	369	424	485	556	419.3	82.6	336.7	501.9
PS05	TESTPHAS	100	500	104	159	204	260	346	206.0	64.1	142.0	270.1
PS06	TESTACT	100	800	320	481	579	614	779	547.3	108.7	438.6	655.9
PS07	SDOCPHAS	50	300	53	85	117	154	280	126.3	58.8	67.5	185.0
PS08	SDOACT	250	600	377	450	520	542	572	498.1	53.3	444.9	551.4
PS09	SCH67	239	1552	373	720	948	1112	1403	934.9	264.2	670.7	1199.2
PS10	CMPLXTOT	60	240	60	80	100	120	150	102.5	24.5	78.0	127.0
PS11	CMPXPERS	80	120	80	90	100	100	120	99.0	10.7	88.3	109.7
PS12	CMPXPROD	80	120	80	80	90	100	100	89.5	8.9	80.6	98.4
PS13	CMPXEXTR	100	200	100	100	110	120	160	114.0	17.6	96.4	131.6
PS14	NEWDESGN	0	999	153	527	668	906	999	660.9	253.2	407.8	914.1
PS15	NEWCODE	0	999	267	658	776	914	999	754.3	188.0	566.3	942.4
PS16	NEWTEST	0	999	356	801	907	967	999	857.8	149.7	708.1	1007.6
PS17	APLICATN	86	999	350	350	350	350	350	350.0	0.0	350.0	350.0
PS18	RESOURCE	100	400	211	211	211	211	211	211.0	0.0	211.0	211.0
PS19	UTILITY	65	100	80	80	80	80	80	80.0	0.0	80.0	80.0
PS20	PLATFORM	60	250	100	100	100	100	100	100.0	0.0	100.0	100.0
PS81	CMPLXITY	320	680	320	360	400	440	500	405.0	48.9	356.1	453.9

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 17 JAN 80 09 40

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	PRCO																			
NUMBER OF CLUSTERS	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0
	1	6	3	7	7	6	2	4	7	1	9	0	5	7	7	7	6	7	7	8
	0	1	0	1	5	2	0	0	2	0	0	0	0	3	4	6	3	8	7	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
19	*	*	*	*	*	*	*	*	*	*	*****	*	*	*	*	*	*	*	*	*
18	*	*	*	*	*	*	*	*****	*	*****	*	*	*	*	*	*	*	*	*	*
17	*	*	*	*****	*	*	*	*****	*	*****	*	*	*	*	*	*	*	*	*	*
16	*	*	*	*****	*	*	*	*****	*	*****	*	*	*	*	*	*	*	*	*****	*
15	*	*	*****	*****	*	*	*	*****	*	*****	*	*	*	*	*	*	*	*	*****	*
14	*****	*****	*****	*****	*	*	*	*****	*	*****	*	*	*	*	*	*	*	*	*****	*
13	*****	*****	*****	*****	*	*	*	*****	*	*****	*	*	*	*	*	*	*	*	*****	*
12	*****	*****	*****	*****	*	*	*	*****	*	*****	*	*	*	*	*	*	*	*	*****	*
11	*****	*****	*****	*****	*	*	*	*****	*	*****	*	*	*****	*	*	*	*	*	*****	*
10	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*	*	*****	*	*	*	*	*****	*****	*
9	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*	*	*****	*	*	*	*	*****	*****	*
8	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*	*	*****	*	*	*	*	*****	*****	*
7	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*	*	*****	*	*	*	*	*****	*****	*
6	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*	*	*****	*	*	*	*	*****	*****	*
5	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*	*	*****	*	*	*	*	*****	*****	*
4	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*	*	*****	*	*	*	*	*****	*****	*
3	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*
2	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*
1	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*

Figure A.6.2-2. PRICE S3: Cluster Map for 20 Independent Systems

Table A.6.2-5. PRICE S3: Summary Statistics for 9 Large Systems

CODE	NAME	-ALLOWED-RANGE-		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
PS01	DESGPHAS	200	500	229	260	296	352	364	301.9	48.2	253.7	350.1
PS02	DESGACT	200	800	593	628	641	711	787	666.8	61.2	605.6	728.0
PS03	CODEPHAS	150	500	296	318	375	406	447	364.8	50.0	314.8	414.8
PS04	CODEACT	150	600	379	408	466	498	556	459.6	55.2	404.4	514.7
PS05	TESTPHAS	100	500	121	171	205	255	346	215.9	65.2	150.7	281.1
PS06	TESTACT	100	800	439	539	606	628	651	580.4	69.1	511.4	649.5
PS07	SDOCPHAS	50	300	53	60	100	157	242	117.6	61.8	55.7	179.4
PS08	SDOACT	250	600	436	463	540	552	572	515.9	49.3	466.6	565.2
PS09	SCH67	239	1552	657	948	1045	1276	1403	1082.9	230.5	852.4	1313.3
PS10	CMPLXTOT	60	240	80	85	100	125	150	106.7	23.5	83.2	130.1
PS11	CMPXPERS	80	120	90	100	100	105	110	101.1	6.0	95.1	107.1
PS12	CMPXPROD	80	120	80	80	90	95	100	87.8	8.3	79.4	96.1
PS13	CMPXEXTR	100	200	100	100	120	120	160	117.8	18.6	99.2	136.3
PS14	NEWDESGN	0	999	153	409	640	716	891	573.3	225.4	347.9	798.8
PS15	NEWCODE	0	999	267	612	674	843	900	686.2	192.1	494.1	878.3
PS16	NEWTEST	0	999	356	757	813	951	983	804.0	189.9	614.1	993.9
PS17	APLICATN	86	999	350	350	350	350	350	350.0	0.0	350.0	350.0
PS18	RESOURCE	100	400	211	211	211	211	211	211.0	0.0	211.0	211.0
PS19	UTILITY	65	100	80	80	80	80	80	80.0	0.0	80.0	80.0
PS20	PLATFORM	60	250	100	100	100	100	100	100.0	0.0	100.0	100.0
PS81	CMPLXITY	320	680	360	370	400	450	500	413.3	46.9	366.4	460.2

	PRCO								
NUMBER OF	0	0	0	0	0	0	0	1	0
CLUSTERS	1	6	3	2	4	7	9	0	5
	0	1	0	0	0	3	0	0	0
	0	0	0	0	0	0	0	0	0
9	*	*	*	*	*	*	*	*	*
8	*	*	*	*	*	*	*****	*	*
7	*	*	*	*****	*	*****	*	*	*
6	*****	*	*****	*	*****	*	*	*	*
5	*****	*****	*****	*	*****	*	*	*	*
4	*****	*****	*****	*****	*****	*	*	*	*
3	*****	*****	*****	*****	*****	*****	*****	*	*
2	*****	*****	*****	*****	*****	*****	*****	*	*
1	*****	*****	*****	*****	*****	*****	*****	*	*

Figure A.6.2-3. PRICE S3: Cluster Map for 9 Large Systems

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Table A.6.2-6. PRICE S3: Summary Statistics for 11 Small Systems

CODE	NAME	-ALLOWED-RANGE-		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
PS01	DESGPHAS	200	500	257	316	375	441	474	372.1	70.4	301.7	442.5
PS02	DESGACT	200	800	560	587	658	750	787	663.5	83.6	579.9	747.0
PS03	CODEPHAS	150	500	160	221	302	375	461	291.5	94.1	197.3	385.6
PS04	CODEACT	150	600	240	338	393	443	513	386.4	88.7	297.6	475.1
PS05	TESTPHAS	100	500	104	158	164	265	302	198.0	65.1	132.9	263.1
PS06	TESTACT	100	800	320	459	490	603	779	520.1	129.7	390.4	649.8
PS07	SDOCPHAS	50	300	66	100	118	146	280	133.4	58.1	75.2	191.5
PS08	SDOACT	250	600	377	438	488	522	563	483.6	54.2	429.4	537.8
PS09	SCH67	239	1552	373	612	910	1015	1134	813.9	233.1	580.8	1047.0
PS10	CMPLXTOT	60	240	60	70	100	120	140	99.1	25.9	73.2	125.0
PS11	CMPXPERS	80	120	80	90	100	100	120	97.3	13.5	83.8	110.8
PS12	CMPXPROD	80	120	80	80	90	100	100	90.9	9.4	81.5	100.3
PS13	CMPXEXTR	100	200	100	100	100	120	150	110.9	17.0	93.9	127.9
PS14	NEWDESGN	0	999	260	624	770	946	999	732.6	261.8	470.8	994.4
PS15	NEWCODE	0	999	446	670	822	946	999	810.1	173.3	636.7	983.4
PS16	NEWTEST	0	999	732	800	928	975	999	901.9	94.9	807.0	996.8
PS17	APLICATN	86	999	350	350	350	350	350	350.0	0.0	350.0	350.0
PS18	RESOURCE	100	400	211	211	211	211	211	211.0	0.0	211.0	211.0
PS19	UTILITY	65	100	80	80	80	80	80	80.0	0.0	80.0	80.0
PS20	PLATFORM	60	250	100	100	100	100	100	100.0	0.0	100.0	100.0
PS81	CMPLXITY	320	680	320	340	400	440	480	398.2	51.7	346.4	449.9

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	PRCO											
NUMBER OF CLUSTERS	0	0	0	0	0	0	1	0	0	0	0	0
	6	7	7	7	8	7	1	6	7	7	7	7
	2	1	5	7	0	2	0	3	8	4	6	6
	0	0	0	0	0	0	0	0	0	0	0	0
11	*	*	*	*	*	*	*	*	*	*	*	*
10	*	*****	*	*	*	*	*	*	*	*	*	*
9	*	*****	*****	*	*	*	*	*	*	*	*	*
8	*	*****	*****	*****	*****	*****	*	*	*	*	*	*
7	*****	*****	*****	*****	*****	*****	*	*	*	*	*	*
6	*****	*****	*****	*****	*****	*****	*****	*	*	*	*	*
5	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
4	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
3	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
2	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****

Figure A.6.2-4. PRICE S3: Cluster Map for 11 Small Systems

A.6.3 COCOMO MODEL

<u> X </u>	Objective	<u> X </u>	Subjective
<u> — </u>	Absolute	<u> X </u>	Relative
<u> — </u>	Explicit	<u> X </u>	Derived
<u> — </u>	Static	<u> X </u>	Dynamic
<u> X </u>	Predictive	<u> — </u>	Explanatory

This category measures all four components of software development. All the measures are subjective in the manner in which they are scaled and in the interpretation of the scale values, although objective data are needed to determine values. The estimates of the measures are predictive but also dynamic, since changes in requirements and the composition of the development team may (and usually do) occur during development.

The remainder of this subsection contains tables that describe the COCOMO measures. These tables include

- Descriptions of the measures with code numbers, mnemonic names, acceptable values, and brief phrases (Table A.6.3-1)
- Values of the measures for 25 systems (Table A.6.3-2)

Table A.6.3-1. COCOMO: Description of Measures

Code	Measure	Range		Description
		Low	High	
Product				
CO01	RELY	075	140	Required Software Reliability
CO02	DATA	094	116	Data Base Size
CO03	CPLX	070	165	Product Complexity
Computer				
CO04	TIME	100	166	Execution-Time Constraint
CO05	STOR	100	156	Main Storage Constraint
CO06	VRT	087	130	Virtual Machine Volatility
CO07	TURN	087	115	Computer Turnaround Time
Personnel				
CO08	ACAP	071	146	Analyst Capability
CO09	AEXP	082	129	Applications Experience
CO10	PCAP	070	142	Programmer Capability
CO11	VEXP	090	121	Virtual Machine Experience
CO12	LEXP	095	114	Programming Language Experience
Project				
CO13	MODP	082	124	Use of Modern Programming Practices
CO14	TOOL	083	124	Use of Software Tools
CO15	SCED	110	123	Required Development Schedule

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Table A.6.3-2. COCOMO: Values of the Measures
for 25 Systems

OBS	PRCO	C011	C012	C013	C014	C015
1	0100	100	95	82	83	104
2	0200	100	95	124	124	100
3	0300	100	95	124	110	100
4	0400	100	95	110	110	100
5	0500	100	95	82	83	100
6	0600	100	95	82	83	100
7	0700	100	95	91	100	104
8	0800	100	95	82	83	104
9	0900	100	95	110	100	104
10	1000	100	95	91	100	104
11	1100	100	95	100	110	104
12	9000	100	95	100	100	104
13	0610	100	95	82	83	104
14	0620	100	95	91	91	104
15	0630	100	95	82	91	108
16	0631	100	95	82	83	108
17	0632	100	95	100	124	108
18	0710	100	95	91	110	104
19	0720	100	95	82	91	104
20	0730	100	95	100	100	104
21	0740	100	100	100	110	104
22	0750	100	100	100	124	104
23	0760	100	95	100	100	123
24	0770	100	95	91	91	104
25	0780	100	100	91	100	108

OBS	PRCO	C001	C002	C003	C004	C005	C006	C007	C008	C009	C010
1	0100	88	94	100	100	100	87	107	86	100	86
2	0200	88	94	100	100	100	87	107	86	100	117
3	0300	88	94	100	100	106	87	107	100	100	117
4	0400	88	94	100	111	106	87	107	100	113	117
5	0500	88	94	100	100	100	87	107	86	100	86
6	0600	88	94	100	100	106	87	107	100	100	86
7	0700	88	94	100	111	100	87	107	119	113	117
8	0800	100	94	115	100	100	87	107	100	91	70
9	0900	88	94	100	111	100	87	100	100	100	117
10	1000	88	94	100	111	100	87	100	100	100	100
11	1100	88	94	100	111	106	87	100	100	100	117
12	9000	88	94	100	111	100	87	107	100	100	100
13	0610	88	94	100	100	106	87	107	100	100	86
14	0620	88	94	100	100	100	87	107	100	113	70
15	0630	88	94	100	100	100	87	107	100	91	86
16	0631	88	94	100	100	100	87	107	100	100	86
17	0632	88	94	100	100	100	87	100	100	91	142
18	0710	88	94	100	111	106	87	107	119	113	117
19	0720	88	94	100	111	100	87	107	119	91	70
20	0730	88	94	100	111	100	87	107	119	113	117
21	0740	88	94	100	100	100	87	107	119	113	142
22	0750	88	94	100	100	100	87	107	119	113	142
23	0760	88	94	100	100	100	87	107	119	100	70
24	0770	88	94	100	100	100	87	107	119	100	117
25	0780	88	94	100	100	100	87	107	119	113	142

A.7 ADDITIONAL DETAIL CLASS OF MEASURES

The Additional Detail class primarily measures the development product, although a few of the measures measure the development process. The additional detail includes

- Miscellaneous Detail (MS01 through MS40)
 - Product Attributes (MS01 through MS10)
 - Processing Attributes (MS11 through MS20)
 - Documentation (MS21 through MS25)
 - Average Staff (MS26 through MS28)
 - Other (MS29 through MS40)
- Code Breakdown (SW01 through SW90)
 - Baseline Diagram Components (SW01 through SW05)
 - Decision Modules (SW06 through SW10)
 - Low-Order Language LOC (SW11 through SW15)
 - Middle-Order Language LOC (SW16 through SW20)
 - High-Order Language LOC (SW21 through SW25)
 - Total LOC (SW26 through SW34)
 - Low-Order Executable LOC (SW31 through SW35)
 - Middle-Order Executable LOC (SW36 through SW40)
 - High-Order Executable LOC (SW41 through SW45)
 - Total Executable LOC (SW46 through SW50)
 - Decisions (SW51 through SW55)
 - Library Changes (SW56 through SW60)
 - Software Changes (SW61 through SW65)
 - Software Errors (SW66 through SW70)
 - Comments (SW71 through SW75)
 - Derived Values (SW76 through SW90)
- Estimated Statistics (ES01 through ES19)
 - Components (ES01)
 - Modules (ES02 through ES04)
 - Computer Runs (ES05)

- Source Code Changes (ES06)
- Pages of Documentation (ES07)
- Lines of Code (ES08 through ES10)
- Executable Statements (ES11 through ES13)
- Work Hours (ES14 through ES16)
- Computer Hours (ES17 and ES19)

A.7.1 MISCELLANEOUS

- <u>X</u> -	Objective	- - -	Subjective
- <u>X</u> -	Absolute	- - -	Relative
- <u>X</u> -	Explicit	- - -	Derived
- <u>X</u> -	Static	- - -	Dynamic
- - -	Predictive	- <u>X</u> -	Explanatory

This category primarily measures the development product. A few of the measures measure the development process. All but a few of the measures are objective, absolute, explicit, static, and explanatory at the end of the project; the others (average staff) are derived. Estimates (dynamic) of the measures must be made for prediction. A certain number of the measures become static during implementation; the rest become static at the end of the project.

The remainder of this subsection contains tables and figures that describe the Miscellaneous measures with brief phrases, raw numbers, simple statistics, and graphics. These tables and figures include

- Descriptions of the measures with code numbers, mnemonic names, acceptable values, and brief phrases (Table A.7.1-1)
- Values of the measures for 25 systems (Table A.7.1-2)
- Summary statistics for 11 projects (Table A.7.1-3)
- Cluster map for 11 projects (Figure A.7.1-1)
- Summary statistics for 20 independent systems (Table A.7.1-4)

- Cluster map for 20 independent systems (Figure A.7.1-2)
- Summary statistics for 9 large systems (Table A.7.1-5)
- Cluster map for 9 large systems (Figure A.7.1-3)
- Summary statistics for 11 small systems (Table A.7.1-6)
- Cluster map for 11 small systems (Figure A.7.1-4)

Table A.7.1-1. Miscellaneous: Description of Measures
(1 of 2)

Code	Measure	Range		Description
		Low	High	
Product Attributes				
MS01	PRNPROGS	01	12	Number of Programs
MS02	PRNSUBS	01	36	Number of Subsystems
Data Sets				
MS03	PRNDSIN	00	12	Input
MS04	PRNDSIO	00	24	Input/Output
MS05	PRNDSOUT	00	12	Output
MS06	PRNDSTOT	00	48	Total
Data Base				
MS07	PRDBIN	0000	2000	Input
MS08	PRDBIO	0000	2000	Input/Output
MS09	PRDBOUT	0000	2000	Output
MS10	PRDBTOT	0000	2000	Total
Processing Attributes				
MS11	CPNPROGS	01	12	Number of Programs
MS12	CPNSUBS	01	36	Number of Subsystems
Data Sets				
MS13	CPNDSIN	00	12	Input
MS14	CPNDSIO	00	24	Input/Output
MS15	CPNDSOUT	00	12	Output
MS16	CPNDSTOT	00	48	Total
Data Base				
MS17	CPDBIN	0000	2000	Input
MS18	CPDBIO	0000	2000	Input/Output
MS19	CPDBOUT	0000	2000	Output
MS20	CPDBTOT	0000	2000	Total
Documentation				
MS21	PAGDESGN	0000	2400	Pages of Design Document
MS22	PAGTPLAN	0000	1200	Pages of Test Plan

Table A.7.1-1. Miscellaneous: Description of Measures
(2 of 2)

Code	Measure	Range		Description
		Low	High	
Documentation (Continued)				
MS23	PAGUSERS	0000	4800	Pages of User's Guide/System Description
MS24	PAGPROLG	0000	4800	Pages of Prologs
MS25	PAGTOTAL	00000	13200	Total Pages
Average Staff				
MS26	AVGSP	000	169	Programmers
MS27	AVGSPM	000	267	Programmers and Managers
MS28	AVGSPMO	000	267	All Personnel
MS29		0000	0000	Not Defined
MS30		0000	0000	Not Defined
MS31		0000	0000	Not Defined
MS32		0000	0000	Not Defined
MS33		0000	0000	Not Defined
MS34		0000	0000	Not Defined
MS35		0000	0000	Not Defined
MS36		0000	0000	Not Defined
MS37		0000	0000	Not Defined
MS38		0000	0000	Not Defined
MS39		0000	0000	Not Defined
MS40		0000	0000	Not Defined

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Table A.7.1-2. Miscellaneous: Values of the Measures for
25 Systems (1 of 2)

PRCD	MS01	MS02	MS03	MS04	MS05	MS06	MS07	MS08	MS09	MS10
0100	3	14	11	2	7	20	197	27	66	290
0200	1	8	6	0	4	10	102	0	36	138
0300	2	6	7	3	4	14	171	145	64	380
0400	7	11	8	3	7	18	141	159	229	529
0500	1	9	6	3	2	11	105	15	25	145
0600	4	17	7	13	4	24	133	1076	246	1455
0700	8	15	8	12	4	24	137	320	96	553
0800	1	3	6	0	11	17	80	0	138	218
0900	1	8	3	3	3	9	71	47	40	158
1000	2	7	4	3	3	10	94	64	39	197
1100	1	3	3	2	1	6	57	20	16	93
9000	4	18	8	7	6	21	155	143	83	381
0610	2	12	7	11	3	21	133	1036	39	1208
0620	1	2	5	0	2	7	150	0	222	372
0630	1	3	4	2	0	6	221	103	0	324
0631	1	2	4	1	0	5	206	78	0	284
0632	1	1	1	0	1	2	15	0	25	40
0710	1	2	1	0	2	3	65	0	157	222
0720	1	3	3	1	2	6	146	15	24	185
0730	1	4	4	1	3	8	165	15	145	225
0740	1	1	3	3	1	7	3	145	13	161
0750	1	1	0	2	1	3	0	142	13	155
0760	1	2	3	1	0	4	48	6	0	54
0770	1	1	5	0	1	6	72	0	6	78
0780	1	1	2	4	0	6	45	37	0	82

PRCD	MS11	MS12	MS13	MS14	MS15	MS16	MS17	MS18	MS19	MS20
0100	3	7	6	0	5	11	123	0	49	172
0200	1	4	3	0	3	6	58	0	23	81
0300	2	6	4	3	1	8	168	145	47	360
0400	5	8	4	3	7	14	125	159	229	513
0500	1	4	3	2	1	6	61	10	13	84
0600	3	11	4	13	3	20	85	1076	233	1394
0700	4	7	4	6	2	12	129	274	79	482
0800	1	3	6	0	11	17	80	0	138	218
0900	1	6	3	2	3	8	71	47	40	158
1000	2	7	4	3	3	10	94	64	39	197
1100	1	3	3	2	1	6	57	20	16	93
9000	4	16	8	7	6	21	155	143	83	381
0610	2	6	4	11	2	17	85	1036	26	1147
0620	1	2	4	0	2	6	150	0	222	372
0630	1	2	3	2	0	5	221	103	0	324
0631	1	1	3	1	0	4	206	78	0	284
0632	1	1	1	0	1	2	15	0	25	40
0710	1	1	1	0	2	3	65	0	157	222
0720	1	3	3	1	1	5	146	15	13	174
0730	1	4	4	1	2	7	165	15	142	222
0740	1	1	0	3	1	4	0	145	13	158
0750	1	1	0	2	1	3	0	142	13	155
0760	1	2	3	1	0	4	48	6	0	54
0770	1	1	5	0	1	6	72	0	6	78
0780	1	1	2	4	0	6	45	37	0	82

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Table A.7.1-2. Miscellaneous: Values of the Measures for
25 Systems (2 of 2)

PRCO	MS21	MS22	MS23	MS24	MS25	MS26	MS27	MS28
0100	600	100	1305	468	2473	39	47	60
0200	300	0	583	221	1104	49	56	63
0300	800	60	562	191	1613	35	50	54
0400	600	225	600	358	1793	43	57	61
0500	300	60	638	122	1120	24	33	39
0600	751	159	1480	627	3017	50	62	71
0700	945	100	1157	493	2695	44	54	61
0800	340	68	253	93	754	13	18	23
0900	825	280	629	252	1986	32	43	49
1000	940	247	782	281	2250	32	44	52
1100	240	106	280	96	722	10	14	16
9000	2005	633	1691	629	4958	71	95	111
0610	650	158	1131	477	2416	36	44	53
0620	50	0	150	53	253	6	8	10
0630	51	1	199	97	348	18	22	25
0631	42	0	184	58	284	12	15	19
0632	9	1	15	39	64	6	7	7
0710	176	10	205	121	512	8	11	12
0720	165	15	231	78	489	6	6	7
0730	338	44	343	101	826	13	16	18
0740	33	6	59	28	126	4	5	6
0750	58	5	110	38	211	4	5	6
0760	88	13	120	56	277	7	8	8
0770	11	5	22	23	61	3	4	4
0780	46	2	67	41	156	11	13	15

Table A.7.1-3. Miscellaneous: Summary Statistics for 11 Projects

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
MS01	PRNPROGS	1	12	1	1	2	4	8	2.8	2.5	0.3	5.3
MS02	PRNSUBS	1	36	3	6	8	14	17	9.2	4.6	4.5	13.8
MS03	PRNDSIN	0	12	3	4	6	8	11	6.3	2.4	3.9	8.6
MS04	PRNDSIO	0	24	0	2	3	3	13	4.0	4.4	-0.4	8.4
MS05	PRNDSOUT	0	12	1	3	4	7	11	4.5	2.8	1.7	7.4
MS06	PRNDSTOT	0	48	6	10	14	20	24	14.8	6.2	8.6	21.0
MS07	PRDBIN	0	2000	57	80	105	141	197	117.1	43.0	74.0	160.1
MS08	PRDBIO	0	2000	0	15	47	159	1076	170.3	315.5	-145.2	485.7
MS09	PRDBOUT	0	2000	16	36	64	138	246	90.5	80.6	9.9	171.1
MS10	PRDBTOT	0	2000	93	145	218	529	1455	377.8	390.0	-12.2	767.8
MS11	CPNPROGS	1	12	1	1	2	3	5	2.2	1.4	0.8	3.6
MS12	CPNSUBS	1	36	3	4	6	7	11	6.0	2.4	3.6	8.4
MS13	CPNDSIN	0	12	3	3	4	4	6	4.0	1.1	2.9	5.1
MS14	CPNDSIO	0	24	0	0	2	3	13	3.1	3.7	-0.6	6.8
MS15	CPNDSOUT	0	12	1	1	3	5	11	3.6	3.0	0.6	6.7
MS16	CPNDSTOT	0	48	6	6	10	14	20	10.7	4.7	6.0	15.4
MS17	CPDBIN	0	2000	57	61	85	125	168	95.5	36.1	59.4	131.7
MS18	CPDBIO	0	2000	0	0	47	159	1076	163.2	315.1	-151.9	478.3
MS19	CPDBOUT	0	2000	13	23	47	138	233	82.4	81.3	1.1	163.7
MS20	CPDBTOT	0	2000	81	93	197	482	1394	341.1	381.0	-39.9	722.1
MS21	PAGDESGN	0	2400	240	300	600	825	945	603.7	269.3	334.5	873.0
MS22	PAGTPLAN	0	1200	0	60	100	225	280	127.7	88.8	38.9	216.6
MS23	PAGUSERS	0	4800	253	562	629	1157	1480	751.7	398.5	353.2	1150.3
MS24	PAGPROLG	0	4800	93	122	252	468	627	292.0	177.0	115.0	469.0
MS25	PAGTOTAL	0	13200	722	1104	1793	2473	3017	1775.2	787.6	987.6	2562.8
MS26	AVGSP	0	169	10	24	35	44	50	33.7	13.5	20.3	47.2
MS27	AVGSPM	0	227	14	33	47	57	62	43.6	15.9	27.7	59.5
MS28	AVGSPMO	0	267	16	39	54	61	74	50.2	17.6	32.5	67.8

	PRCO										
NUMBER OF	0	0	0	0	0	1	0	0	0	1	0
CLUSTERS	1	7	3	4	9	0	2	5	8	1	6
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
11	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*	*	*	*****	*	*	*	*
9	*	*	*	*	*	*	*****	*****	*****	*	*
8	*	*	*	*	*****	*****	*****	*****	*****	*	*
7	*	*	*****	*****	*****	*****	*****	*****	*****	*	*
6	*	*	*****	*****	*****	*****	*****	*****	*****	*	*
5	*****	*****	*****	*****	*****	*****	*****	*****	*****	*	*
4	*****	*****	*****	*****	*****	*****	*****	*****	*****	*	*
3	*****	*****	*****	*****	*****	*****	*****	*****	*****	*	*
2	*****	*****	*****	*****	*****	*****	*****	*****	*****	*	*
1	*****	*****	*****	*****	*****	*****	*****	*****	*****	*	*

Figure A.7.1-1. Miscellaneous: Cluster Map for 11 Projects

Table A.7.1-4. Miscellaneous: Summary Statistics for 20 Independent Systems

CODE	NAME	-ALLOWED-RANGE-		-ACTUAL-RANGE-					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
MS01	PRNPROGS	1	12	1	1	1	2	7	1.5	1.4	0.2	2.9
MS02	PRNSUBS	1	36	1	2	3	8	14	5.0	4.1	1.0	9.1
MS03	PRNDSIN	0	12	0	3	4	6	11	4.5	2.6	2.0	7.1
MS04	PRNDSIO	0	24	0	0	2	3	11	2.2	2.4	-0.2	4.6
MS05	PRNDSOUT	0	12	0	1	2	4	11	2.8	2.8	0.1	5.6
MS06	PRNDSTOT	0	48	3	6	8	13	21	9.6	5.5	4.1	15.1
MS07	PRDBIN	0	2000	0	59	98	149	221	103.3	61.0	42.3	164.3
MS08	PRDBIO	0	2000	0	2	24	132	1036	98.8	227.8	-129.0	326.6
MS09	PRDBOUT	0	2000	0	13	38	120	229	63.6	73.2	-9.6	136.8
MS10	PRDBTOT	0	2000	54	140	191	316	1208	260.7	252.5	8.2	513.2
MS11	CPNPROGS	1	12	1	1	1	2	5	1.4	1.0	0.5	2.4
MS12	CPNSUBS	1	36	1	1	3	6	8	3.6	2.3	1.3	5.9
MS13	CPNDSIN	0	12	0	3	3	4	6	3.3	1.6	1.6	4.9
MS14	CPNDSIO	0	24	0	0	2	3	11	2.0	2.5	-0.5	4.5
MS15	CPNDSOUT	0	12	0	1	2	3	11	2.3	2.7	-0.3	5.0
MS16	CPNDSTOT	0	48	3	5	6	10	17	7.6	4.2	3.4	11.8
MS17	CPDBIN	0	2000	0	57	76	141	221	91.7	57.2	34.5	148.9
MS18	CPDBIO	0	2000	0	0	18	132	1036	97.2	228.4	-131.2	325.6
MS19	CPDBOUT	0	2000	0	13	25	116	229	59.3	74.4	-15.1	133.7
MS20	CPDBTOT	0	2000	54	86	173	299	1147	243.2	243.4	-0.2	486.6
MS21	PAGDESGN	0	2400	11	53	270	600	940	330.5	299.7	30.8	630.3
MS22	PAGTPLAN	0	1200	0	5	30	105	280	70.3	89.4	-19.2	159.7
MS23	PAGUSERS	0	4800	22	128	267	622	1305	413.4	358.8	54.7	772.2
MS24	PAGPROLG	0	4800	23	54	99	244	477	160.3	141.4	18.9	301.6
MS25	PAGTOTAL	0	13200	61	259	738	1748	2473	974.5	823.3	151.2	1797.8
MS26	AVGSP	0	169	3	6	13	34	49	19.6	15.0	4.6	34.7
MS27	AVGSPM	0	227	4	8	17	44	58	25.3	19.3	6.0	44.6
MS28	AVGSPMO	0	267	4	9	21	53	63	29.0	22.0	7.1	51.0

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	PRCD																			
NUMBER OF CLUSTERS	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	1	3	4	9	0	6	2	5	7	7	7	8	1	6	6	7	7	7	7	7
	0	0	0	0	0	1	0	0	1	2	3	0	0	2	3	4	5	6	7	8
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
19	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*****	*	*	*	*
18	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*****	*	*	*****	*
17	*	*	*	*	*	*	*****	*	*	*	*	*	*	*	*	*****	*	*	*****	*
16	*	*	*	*	*	*	*****	*	*	*	*	*	*	*	*	*****	*	*	*****	*
15	*	*	*	*	*	*	*****	*****	*****	*****	*	*	*	*	*	*****	*	*	*****	*
14	*	*	*	*	*	*	*****	*****	*****	*****	*	*	*	*	*	*****	*****	*****	*****	*
13	*	*	*	*	*	*	*****	*****	*****	*****	*	*	*	*	*	*****	*****	*****	*****	*
12	*	*	*	*****	*	*	*****	*****	*****	*****	*	*	*	*	*	*****	*****	*****	*****	*
11	*	*	*	*****	*	*	*****	*****	*****	*****	*	*	*	*	*	*****	*****	*****	*****	*
10	*	*	*	*****	*	*	*****	*****	*****	*****	*	*	*	*	*	*****	*****	*****	*****	*
9	*	*	*	*****	*	*	*****	*****	*****	*****	*	*	*	*	*	*****	*****	*****	*****	*
8	*	*****	*****	*****	*	*	*****	*****	*****	*****	*	*	*	*	*	*****	*****	*****	*****	*
7	*	*****	*****	*****	*	*	*****	*****	*****	*****	*	*	*	*	*	*****	*****	*****	*****	*
6	*	*****	*****	*****	*	*	*****	*****	*****	*****	*	*	*	*	*	*****	*****	*****	*****	*
5	*	*****	*****	*****	*	*	*****	*****	*****	*****	*	*	*	*	*	*****	*****	*****	*****	*
4	*****	*****	*****	*****	*	*	*****	*****	*****	*****	*	*	*	*	*	*****	*****	*****	*****	*
3	*****	*****	*****	*****	*	*	*****	*****	*****	*****	*	*	*	*	*	*****	*****	*****	*****	*
2	*****	*****	*****	*****	*	*	*****	*****	*****	*****	*	*	*	*	*	*****	*****	*****	*****	*
1	*****	*****	*****	*****	*	*	*****	*****	*****	*****	*	*	*	*	*	*****	*****	*****	*****	*

Figure A.7.1-2. Miscellaneous: Cluster Map for 20 Independent Systems

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Table A.7.1-5. Miscellaneous: Summary Statistics for 9 Large Systems

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
MS01	PRNPROGS	1	12	1	1	2	3	7	2.2	1.9	0.3	4.1
MS02	PRNSUBS	1	36	4	7	8	12	14	8.8	3.1	5.7	11.9
MS03	PRNDSIN	0	12	3	4	6	8	11	6.2	2.4	3.8	8.7
MS04	PRNDSIO	0	24	0	2	3	3	11	3.2	3.1	0.1	6.3
MS05	PRNDSOUT	0	12	2	3	3	6	7	4.0	1.8	2.2	5.8
MS06	PRNDSTOT	0	48	8	10	11	19	21	13.4	5.0	8.4	18.4
MS07	PRDBIN	0	2000	71	98	133	168	197	131.0	41.4	89.6	172.4
MS08	PRDBIO	0	2000	0	15	47	152	1036	167.6	330.6	-163.1	498.2
MS09	PRDBOUT	0	2000	25	38	40	106	229	75.9	67.7	8.2	143.6
MS10	PRDBTOT	0	2000	138	152	225	455	1208	363.3	341.7	21.7	705.0
MS11	CPNPROGS	1	12	1	1	2	3	5	2.0	1.3	0.7	3.3
MS12	CPNSUBS	1	36	4	4	6	7	8	5.8	1.5	4.3	7.3
MS13	CPNDSIN	0	12	3	3	4	4	6	3.9	0.9	3.0	4.8
MS14	CPNDSIO	0	24	0	1	2	3	11	2.8	3.3	-0.5	6.1
MS15	CPNDSOUT	0	12	1	2	3	4	7	3.0	1.9	1.1	4.9
MS16	CPNDSTOT	0	48	6	7	8	13	17	9.7	3.8	5.9	13.4
MS17	CPDBIN	0	2000	58	66	94	145	168	105.6	42.0	63.6	147.6
MS18	CPDBIO	0	2000	0	5	47	152	1036	164.0	332.4	-168.4	496.4
MS19	CPDBOUT	0	2000	13	25	40	96	229	67.6	71.3	-3.7	138.8
MS20	CPDBTOT	0	2000	81	121	197	437	1147	326.0	336.9	-10.9	662.9
MS21	PAGDESGN	0	2400	300	319	600	813	940	594.8	239.0	355.7	833.8
MS22	PAGTPLAN	0	1200	0	52	100	236	280	130.4	100.6	29.8	231.1
MS23	PAGUSERS	0	4800	343	573	629	957	1305	730.3	301.9	428.4	1032.3
MS24	PAGPROLG	0	4800	101	157	252	418	477	275.7	137.3	138.3	413.0
MS25	PAGTOTAL	0	13200	826	1112	1793	2333	2473	1731.2	608.0	1123.2	2339.2
MS26	AVGSP	0	169	13	28	35	41	49	33.7	10.5	23.2	44.2
MS27	AVGSPM	0	227	16	38	44	54	58	43.6	12.8	30.7	56.4
MS28	AVGSPMD	0	267	18	44	53	61	63	49.9	14.0	35.9	63.9

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	PRCO									
NUMBER OF	0	0	0	0	1	0	0	0	0	0
CLUSTERS	1	3	4	9	0	2	5	7	6	
	0	0	0	0	0	0	0	3	1	
	0	0	0	0	0	0	0	0	0	
9	*	*	*	*	*	*	*	*	*	*
8	*	*	*	*	*	*	*	*	*	*
7	*	*	*	*	*	*	*	*	*	*
6	*	*	*	*	*	*	*	*	*	*
5	*	*	*	*	*	*	*	*	*	*
4	*	*	*	*	*	*	*	*	*	*
3	*	*	*	*	*	*	*	*	*	*
2	*	*	*	*	*	*	*	*	*	*
1	*	*	*	*	*	*	*	*	*	*

Figure A.7.1-3. Miscellaneous: Cluster Map for 9 Large Systems

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Table A.7.1-6. Miscellaneous: Summary Statistics for 11 Small Systems

CODE	NAME	-ALLOWED-RANGE-		-ACTUAL-RANGE-					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
MS01	PRNPROGS	1	12	1	1	1	1	1	1.0	0.0	1.0	1.0
MS02	PRNSUBS	1	36	1	1	2	3	3	2.0	0.9	1.1	2.9
MS03	PRNDSIN	0	12	0	2	3	5	6	3.2	1.8	1.4	5.0
MS04	PRNDSIO	0	24	0	0	1	2	4	1.4	1.4	0.0	2.7
MS05	PRNDSOUT	0	12	0	0	1	2	11	1.9	3.1	-1.2	5.0
MS06	PRNDSTOT	0	48	3	4	6	7	17	6.5	3.8	2.7	10.2
MS07	PRDBIN	0	2000	0	45	65	146	221	80.6	66.7	13.9	147.4
MS08	PRDBIO	0	2000	0	0	15	103	145	42.5	58.2	-15.7	100.8
MS09	PRDBOUT	0	2000	0	0	13	138	222	53.5	79.1	-25.6	132.7
MS10	PRDBTOT	0	2000	54	82	161	222	372	176.7	102.5	74.2	279.3
MS11	CPNPROGS	1	12	1	1	1	1	1	1.0	0.0	1.0	1.0
MS12	CPNSUBS	1	36	1	1	2	3	3	1.8	0.9	0.9	2.7
MS13	CPNDSIN	0	12	0	1	3	4	6	2.7	1.9	0.8	4.6
MS14	CPNDSIO	0	24	0	0	1	2	4	1.4	1.4	0.0	2.7
MS15	CPNDSOUT	0	12	0	0	1	2	11	1.8	3.1	-1.3	4.9
MS16	CPNDSTOT	0	48	3	4	5	6	17	5.9	3.9	2.1	9.8
MS17	CPDBIN	0	2000	0	45	65	146	221	80.4	67.1	13.3	147.4
MS18	CPDBIO	0	2000	0	0	15	103	145	42.5	58.2	-15.7	100.8
MS19	CPDBOUT	0	2000	0	0	13	138	222	52.5	79.6	-27.1	132.2
MS20	CPDBTOT	0	2000	54	82	158	222	372	175.5	102.6	72.9	278.0
MS21	PAGDESIGN	0	2400	11	46	58	176	340	114.4	103.5	10.9	217.8
MS22	PAGTPLAN	0	1200	0	2	6	15	106	21.0	34.0	-13.0	55.0
MS23	PAGUSERS	0	4800	22	67	150	231	280	154.2	85.6	68.5	239.8
MS24	PAGPROLG	0	4800	23	38	56	96	121	65.8	32.8	33.1	98.6
MS25	PAGTOTAL	0	13200	61	156	277	512	754	355.4	235.0	120.4	590.4
MS26	AVGSP	0	169	3	4	7	11	18	8.2	4.5	3.7	12.7
MS27	AVGSPM	0	227	4	5	8	14	22	10.4	5.9	4.5	16.2
MS28	AVGSPMC	0	267	4	6	10	16	25	12.0	7.0	5.0	19.0

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NUMBER OF CLUSTERS	PRCO										
	0	0	0	0	0	0	0	0	0	1	0
	6	6	7	7	7	7	7	7	7	1	8
	2	3	4	5	6	7	8	1	2	0	0
	0	0	0	0	0	0	0	0	0	0	0
11	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*****	*	*	*	*	*	*	*	*
9	*	*	*****	*	*****	*	*	*	*	*	*
8	*	*	*****	*	*****	*	*	*	*	*	*
7	*	*	*****	*****	*****	*****	*****	*****	*	*	*
6	*	*	*****	*****	*****	*****	*****	*****	*****	*****	*****
5	*	*	*****	*****	*****	*****	*****	*****	*****	*****	*****
4	*	*	*****	*****	*****	*****	*****	*****	*****	*****	*****
3	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
2	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****

Figure A.7.1-4. Miscellaneous: Cluster Map for 11 Small Systems

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-	X	-	Objective	-	-	-	Subjective
-	X	-	Absolute	-	-	-	Relative
-	X	-	Explicit	-	-	-	Derived
-	X	-	Static	-	-	-	Dynamic
-	-	-	Predictive	-	X	-	Explanatory

This category primarily measures the development product. A few subcategories (changes/errors) measure the development process. Most of the subcategories contain objective, absolute, explicit, static, and explanatory type measures at the end of the project. Several subcategories (SW76 through SW90) contain derived values. The only subjectivity in these measures is in the sense of how to count things. Estimates (dynamic) of the measures must be made for prediction. A certain number of the measures become static during implementation; the rest become static at the end of the project.

The remainder of this subsection contains tables and figures that describe the Code Breakdown measures with brief phrases, raw numbers, simple statistics, and graphics. These tables and figures include

- Descriptions of the measures with code numbers, mnemonic names, acceptable values, and brief phrases (Table A.7.2-1)
- Values of the measures for 25 systems (Table A.7.2-2)
- Summary statistics for 11 projects (Table A.7.2-3)
- Cluster map for 11 projects (Figure A.7.2-1) .
- Summary statistics for 20 independent systems (Table A.7.2-4)
- Cluster map for 20 independent systems (Figure A.7.2-2)

- Summary statistics for 9 large systems
(Table A.7.2-5)
- Cluster map for 9 large systems (Figure A.7.2-3)
- Summary statistics for 11 small systems
(Table A.7.2-6)
- Cluster map for 11 small systems (Figure A.7.2-4)

Table A.7.2-1. Code Breakdown: Description of Measures
(1 of 4)

Code	Measure	Range		Description
		Low	High	
Baseline Diagram Components				
SW01	COMPSN	0000	7200	New
SW02	COMPSE	0000	1800	Extensively Modified
SW03	COMPSS	0000	3600	Slightly Modified
SW04	COMPST	0000	5400	Old
SW05	COMPST	0000	7200	Total
Decision Modules				
SW06	MODSN	0000	4800	New
SW07	MODSE	0000	1200	Extensively Modified
SW08	MODSS	0000	2400	Slightly Modified
SW09	MODSO	0000	3600	Old
SW10	MODST	0000	4800	Total
LOC ALC				
SW11	LOCLOLN	000000	060000	New
SW12	LOCLOLE	000000	015000	Extensively Modified
SW13	LOCLOLS	000000	030000	Slightly Modified
SW14	LOCLOLO	000000	045000	Old
SW15	LOCLOLT	000000	060000	Total
LOC Macros				
SW16	LOCMOLN	000000	060000	New
SW17	LOCMOLE	000000	015000	Extensively Modified
SW18	LOCMOLS	000000	030000	Slightly Modified
SW19	LOCMOLO	000000	045000	Old
SW20	LOCMOLT	000000	060000	Total
LOC FORTRAN				
SW21	LOCHOLN	000000	240000	New
SW22	LOCHOLE	000000	060000	Extensively Modified

Table A.7.2-1. Code Breakdown: Description of Measures
(2 of 4)

Code	Measure	Range		Description
		Low	High	
LOC FORTRAN (Continued)				
SW23	LOCHOLS	000000	120000	Slightly Modified
SW24	LOCHOLO	000000	180000	Old
SW25	LOCHOLT	000000	240000	Total
LOC Total				
SW26	LOCN	000000	240000	New
SW27	LOCE	000000	060000	Extensively Modified
SW28	LOCS	000000	120000	Slightly Modified
SW29	LOCO	000000	180000	Old
SW30	LOCT	000000	240000	Total
Executable ALC				
SW31	EXLOLN	000000	030000	New
SW32	EXLOLE	000000	007500	Extensively Modified
SW33	EXLOLS	000000	015000	Slightly Modified
SW34	EXLOLO	000000	022500	Old
SW35	EXLOLT	000000	030000	Total
Executable Macros				
SW36	EXMOLN	000000	030000	New
SW37	EXMOLE	000000	007500	Extensively Modified
SW38	EXMOLS	000000	015000	Slightly Modified
SW39	EXMOLO	000000	022500	Old
SW40	EXMOLT	000000	030000	Total
Executable FORTRAN				
SW41	EXHOLN	000000	120000	New
SW42	EXHOLE	000000	030000	Extensively Modified
SW43	EXHOLS	000000	060000	Slightly Modified
SW44	EXHOLO	000000	090000	Old
SW45	EXHOLT	000000	120000	Total

Table A.7.2-1. Code Breakdown: Description of Measures
(3 of 4)

Code	Measure	Range		Description
		Low	High	
Executable Total				
SW46	EXLOCN	000000	120000	New
SW47	EXLOCE	000000	030000	Extensively Modified
SW48	EXLOCS	000000	060000	Slightly Modified
SW49	EXLOCO	000000	090000	Old
SW50	EXLOCT	000000	120000	Total
Decisions				
SW51	DECISONN	00000	48000	New
SW52	DECISONE	00000	12000	Extensively Modified
SW53	DECISONS	00000	24000	Slightly Modified
SW54	DECISONO	00000	36000	Old
SW55	DECISONT	00000	48000	Total
Library Changes				
SW56	LCHANGEN	00000	12000	New
SW57	LCHANGEЕ	00000	09000	Extensively Modified
SW58	LCHANGES	00000	06000	Slightly Modified
SW59	LCHANGEО	00000	03000	Old
SW60	LCHANGET	00000	12000	Total
Software Changes				
SW61	SCHANGEN	0000	9000	New
SW62	SCHANGEЕ	0000	6750	Extensively Modified
SW63	SCHANGES	0000	4500	Slightly Modified
SW64	SCHANGEО	0000	2250	Old
SW65	SCHANGET	0000	9000	Total
Software Errors				
SW66	SWERRSN	0000	6000	New
SW67	SWERRSE	0000	4500	Extensively Modified
SW68	SWERRSS	0000	3000	Slightly Modified
SW69	SWERRSO	0000	1500	Old
SW70	SWERRST	0000	6000	Total

Table A.7.2-1. Code Breakdown: Description of Measures
(4 of 4)

Code	Measure	Range		Description
		Low	High	
Percentage of Comments				
SW71	PCOMNTSN	00	99	New
SW72	PCOMNTSE	00	99	Extensively Modified
SW73	PCOMNTSS	00	99	Slightly Modified
SW74	PCOMNTSO	00	99	Old
SW75	PCOMNTST	00	99	Total
Errors per				
SW76	ERRLOC	0000	2500	1000 LOC
SW77	ERREXLOC	0000	5000	1000 Executable LOC
SW78	ERRDECSN	0000	3750	1000 Decision
SW79	ERRCOMP	000	167	Baseline Diagram Component
SW80	ERRMOD	000	250	Decision Module
Decisions per				
SW81	DECLOC	000	200	1000 LOC
SW82	DECEXLOC	000	400	1000 Executable LOC
SW83	DECCOMP	000	200	Baseline Diagram Component
SW84	DECMOD	000	300	Decision Module
SW85	RATIOEXP	000	999	Ratio of LOC to Expanded LOC
Executable LOC per				
SW86	EXLOCLOC	000	500	1000 LOC
SW87	EXLOCOMP	000	667	Baseline Diagram Component
SW88	EXLOCMOD	000	250	Decision Module
SW89	COMPCHNG	000	500	Data Set Components per Change
SW90	PERRCHNG	00	99	Percentage of Errors in Changes

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Table A.7.2-2.. Code Breakdown: Values of the Measures for
25 Systems (1 of 5)

PRCO	SW01	SW02	SW03	SW04	SW05	SW06	SW07	SW08	SW09	SW10
0100	418	45	162	74	699	257	20	113	23	413
0200	327	29	21	58	435	118	20	22	58	218
0300	365	0	19	10	394	153	0	19	10	182
0400	527	6	32	167	732	219	6	26	162	413
0500	128	26	65	319	538	50	23	24	206	303
0600	805	94	119	77	1095	340	67	56	46	509
0700	725	56	109	113	1003	200	53	87	109	419
0800	103	3	0	7	113	83	3	0	7	93
0900	284	40	90	127	541	115	30	47	110	302
1000	346	37	66	106	555	165	17	50	97	329
1100	124	0	27	39	190	44	0	19	33	96
9000	754	77	183	272	1286	324	47	116	240	727
0610	602	83	85	49	819	252	59	45	32	388
0620	74	4	9	2	89	29	4	6	1	40
0630	129	7	25	26	187	59	4	5	13	81
0631	84	7	24	24	139	28	4	5	11	48
0632	45	0	1	2	48	31	0	0	2	33
0710	182	5	17	20	224	46	5	17	20	88
0720	90	2	7	12	111	34	2	6	12	51
0730	203	25	31	36	295	25	25	30	36	116
0740	10	5	15	10	40	8	5	15	10	38
0750	52	0	0	3	55	35	0	0	3	38
0760	81	20	17	7	125	12	17	17	7	52
0770	31	2	0	3	36	13	2	0	0	15
0780	42	0	16	7	65	25	0	0	6	31

PRCO	SW11	SW12	SW13	SW14	SW15	SW16	SW17	SW18	SW19	SW20
0100	1428	0	1148	394	2970	10873	598	1141	3738	16350
0200	344	0	506	307	1157	7692	0	0	0	7692
0300	698	0	1049	269	2016	8337	0	0	0	8337
0400	241	0	283	13623	14147	7279	0	0	0	7279
0500	191	0	506	986	1683	3516	0	1157	3748	8421
0600	0	708	1003	301	2012	22188	433	765	7	23400
0700	50	0	508	976	1534	12348	0	0	0	12348
0800	0	0	0	26	26	0	0	0	0	0
0900	0	0	0	1233	1233	6265	902	2148	0	9315
1000	0	0	0	1675	1675	6898	2155	526	0	9579
1100	179	0	0	506	685	3263	0	0	0	3263
9000	179	0	0	3414	3593	16426	3057	2674	0	22157
0610	0	708	816	0	1524	18071	276	228	7	18582
0620	0	0	0	0	0	2250	0	0	0	2250
0630	0	0	187	301	488	1867	157	537	7	2568
0631	0	0	187	301	488	1493	157	537	7	2194
0632	0	0	0	0	0	374	0	0	0	374
0710	50	0	508	505	1063	2862	0	0	0	2862
0720	0	0	0	0	0	2539	0	0	0	2539
0730	0	0	0	471	471	5189	0	0	0	5189
0740	0	0	0	0	0	0	0	0	0	0
0750	0	0	0	0	0	557	0	0	0	557
0760	0	0	0	0	0	1395	0	0	0	1395
0770	0	0	0	0	0	0	0	0	0	0
0780	0	0	0	0	0	0	0	0	0	0

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Table A.7.2-2. Code Breakdown: Values of the Measures for
25 Systems (2 of 5)

PRCO	SW21	SW22	SW23	SW24	SW25	SW26	SW27	SW28	SW29	SW30
0100	66654	8072	17968	3787	96481	78955	8670	20257	7919	115801
0200	29875	7811	3000	7469	48155	37911	7811	3506	7776	57004
0300	38393	0	3624	624	42641	47428	0	4673	893	52994
0400	42157	1066	3969	7678	54870	49677	1066	4252	21301	76296
0500	8670	8568	5287	44688	67213	12377	8568	6950	49422	77317
0600	65531	13264	6429	3514	88738	87719	14405	8197	3829	114150
0700	35971	15458	13789	12414	77632	48369	15458	14297	13390	91514
0800	14826	125	0	281	15232	14826	125	0	307	15258
0900	28712	9935	7976	11383	58006	34977	10837	10124	12616	68554
1000	31771	4847	8089	11367	56074	38669	7002	8615	13042	67328
1100	7797	0	2331	3612	13740	11239	0	2331	4118	17688
9000	68280	14782	18396	26362	127820	84885	17839	21070	29776	153570
0610	49061	12056	5268	2247	68632	67132	13040	6312	2254	88738
0620	7309	359	527	11	8206	9559	359	527	11	10456
0630	9161	849	634	1256	11900	11028	1006	1358	1564	14956
0631	3973	849	634	1157	6613	5466	1006	1358	1465	9295
0632	5188	0	0	99	5287	5562	0	0	99	5661
0710	9324	595	1063	966	11948	12236	595	1571	1471	15873
0720	6750	663	892	3822	12127	9289	663	892	3822	14666
0730	5853	8650	7838	5740	28081	11042	8650	7838	6211	33741
0740	1430	1021	1947	910	5308	1430	1021	1947	910	5308
0750	3703	0	0	365	4068	4260	0	0	365	4625
0760	1547	4529	2049	328	8453	2942	4529	2049	328	9848
0770	1579	340	0	133	2052	1579	340	0	133	2052
0780	3977	0	944	283	5204	3977	0	944	283	5204

SW31	SW32	SW33	SW34	SW35	SW36	SW37	SW38	SW39	SW40
623	0	519	132	1274	10191	512	979	3498	15180
175	0	256	120	551	7038	0	0	0	7038
98	0	475	135	708	7976	0	0	0	7976
130	0	168	7303	7601	6704	0	0	0	6704
94	0	256	373	723	3285	0	994	3475	7754
0	164	238	405	807	17052	356	552	7	17967
30	0	259	478	767	11389	0	0	0	11389
0	0	0	26	26	0	0	0	0	0
0	0	0	578	578	5008	898	1785	0	7691
0	0	0	707	707	5321	1844	285	0	7450
94	0	0	230	324	2583	0	0	0	2583
94	0	0	1515	1609	12912	2742	2070	0	17724
0	164	99	269	532	14024	230	117	4	14375
0	0	0	0	0	1550	0	0	0	1550
0	0	139	136	275	1478	126	435	3	2042
0	0	139	136	275	1121	126	435	3	1685
0	0	0	0	0	357	0	0	0	357
30	0	259	234	523	2862	0	0	0	2862
0	0	0	0	0	2281	0	0	0	2281
0	0	0	244	244	4652	0	0	0	4652
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	543	0	0	0	543
0	0	0	0	0	1051	0	0	0	1051
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0

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Table A.7.2-2. Code Breakdown: Values of the Measures for
25 Systems (3 of 5)

PRCD	SW41	SW42	SW43	SW44	SW45	SW46	SW47	SW48	SW49	SW50
0100	20145	2339	5858	1475	29817	30959	2851	7356	5105	46271
0200	8746	2422	1147	3034	15349	15959	2422	1403	3154	22938
0300	10091	0	846	138	11075	18165	0	1321	273	19759
0400	12122	142	1011	2868	16143	18956	142	1179	10171	30448
0500	2536	2559	1767	13789	20651	5915	2559	3017	17637	29128
0600	21674	4833	2248	732	29487	38726	5353	3038	1148	48265
0700	10498	5014	4846	3622	23980	21917	5014	5105	4100	36136
0800	4341	72	0	43	4456	4341	72	0	69	4482
0900	6492	3622	2816	5121	18051	11500	4520	4601	5699	26320
1000	7971	1609	2615	4113	16308	13292	3453	2900	4820	24465
1100	2545	0	742	1432	4719	5322	0	742	1662	7726
9000	17008	5231	6173	10666	39078	30114	7973	8243	12181	58511
0610	16589	4196	1945	520	23250	30613	4590	2161	793	38157
0620	2433	248	182	4	2867	3983	248	182	8	4421
0630	2652	389	121	208	3370	4130	515	695	347	5687
0631	1033	389	121	192	1735	2154	515	695	331	3695
0632	1619	0	0	16	1635	1976	0	0	16	1992
0710	2280	192	598	384	3454	5172	192	857	618	6839
0720	2352	405	377	1385	4519	4633	405	377	1385	6800
0730	1677	2530	2242	792	7241	6329	2530	2242	1036	12137
0740	418	255	385	168	1226	418	255	385	168	1226
0750	1517	0	0	107	1624	2060	0	0	107	2167
0760	600	1599	1137	159	3495	1651	1599	1137	159	4546
0770	392	192	0	0	584	392	192	0	0	584
0780	1322	0	0	204	1526	1322	0	0	204	1526

PRCD	SW51	SW52	SW53	SW54	SW55	SW56	SW57	SW58	SW59	SW60
0100	7062	851	1761	479	10153	2422	163	551	97	3233
0200	2395	807	351	793	4346	1266	215	110	155	1746
0300	2386	0	412	47	2845	1171	0	70	14	1255
0400	3273	47	335	1555	5210	1800	32	86	189	2107
0500	970	955	585	4632	7142	363	115	88	292	858
0600	6762	1215	455	265	8697	2663	410	297	88	3458
0700	3014	1331	1210	1099	6654	1886	336	385	154	2761
0800	1219	15	0	10	1244	241	8	0	7	256
0900	2223	1201	849	1555	5828	1464	206	240	167	2077
1000	2252	480	772	1275	4779	1048	163	252	146	1609
1100	699	0	214	355	1268	419	0	89	41	549
9000	5174	1681	1835	3185	11875	2931	369	581	354	4235
0610	5493	1143	340	200	7176	2042	379	230	59	2710
0620	647	16	40	0	703	186	12	19	2	219
0630	622	56	75	65	818	435	19	48	27	529
0631	233	56	75	65	429	184	19	46	25	274
0632	389	0	0	0	389	251	0	2	2	255
0710	770	64	175	138	1147	519	33	63	22	637
0720	723	119	99	430	1371	274	7	18	15	314
0730	446	702	475	252	1875	465	170	114	56	805
0740	139	61	165	67	432	38	11	45	10	104
0750	421	0	0	30	451	143	0	0	3	146
0760	71	375	254	33	733	156	99	47	8	310
0770	102	49	0	0	151	109	16	0	10	135
0780	284	0	0	42	326	209	0	68	12	289

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Table A.7.2-2. Code Breakdown: Values of the Measures for
25 Systems (4 of 5)

PRCO	SW61	SW62	SW63	SW64	SW65	SW66	SW67	SW68	SW69	SW70
0100	2045	136	407	54	2642	315	21	63	8	406
0200	1027	186	89	97	1399	314	57	27	30	427
0300	911	0	51	4	966	388	0	22	2	411
0400	1581	26	60	27	1694	524	9	20	9	561
0500	290	89	55	3	437	86	26	16	1	129
0600	2087	318	189	11	2605	400	61	36	2	499
0700	1320	280	276	41	1917	368	78	77	11	535
0800	138	5	0	0	143	35	1	0	0	36
0900	1257	172	169	40	1638	302	41	41	10	394
1000	802	186	187	40	1054	230	53	54	11	303
1100	325	0	62	2	389	91	0	17	1	109
9000	2384	358	418	82	3081	625	94	110	21	808
0610	1618	298	147	10	2073	316	58	29	2	405
0620	127	8	10	0	145	24	2	2	0	28
0630	342	12	32	1	387	58	2	5	0	65
0631	130	12	31	1	174	22	2	5	0	29
0632	212	0	1	0	213	37	0	0	0	37
0710	382	28	46	2	458	94	7	11	0	112
0720	192	5	11	3	211	49	1	3	1	54
0730	322	145	83	20	570	98	44	25	6	174
0740	28	6	30	0	64	5	1	6	0	12
0750	103	0	0	0	103	25	0	0	0	25
0760	89	79	30	1	199	23	20	8	0	51
0770	78	14	0	7	99	13	2	0	1	17
0780	167	0	52	5	224	35	0	11	1	47

PRCO	SW71	SW72	SW73	SW74	SW75	SW76	SW77	SW78	SW79	SW80
0100	53	62	62	35	55	351	924	400	58	98
0200	53	60	61	53	55	749	1862	983	98	196
0300	55	0	62	68	56	778	2080	1445	104	226
0400	43	59	59	50	46	735	1842	1077	77	136
0500	39	58	52	57	54	167	443	181	24	43
0600	41	46	47	59	43	437	1034	574	46	98
0700	38	54	53	58	46	585	1481	804	53	119
0800	44	70	0	73	45	236	803	2942	32	39
0900	52	51	46	52	51	575	1497	676	73	130
1000	49	43	52	55	50	450	1239	634	55	92
1100	41	0	49	66	45	616	1411	860	57	114
9000	49	48	49	55	50	526	1381	680	63	111
0610	40	47	49	58	42	456	1061	564	49	104
0620	45	25	42	42	44	268	633	398	31	70
0630	47	36	41	61	47	435	1143	795	35	80
0631	42	36	41	61	44	312	785	676	21	60
0632	51	0	0	74	52	654	1857	951	77	112
0710	38	37	38	52	39	706	1638	976	50	127
0720	37	26	42	51	39	368	794	394	49	100
0730	37	60	61	68	54	516	1434	928	59	150
0740	58	67	64	69	64	226	979	278	30	32
0750	33	0	0	71	36	541	1154	554	45	66
0760	22	49	28	41	37	518	1122	696	41	98
0770	50	39	0	76	50	828	2911	1126	47	113
0780	43	0	62	18	45	903	3080	1442	72	152

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Table A.7.2-2. Code Breakdown: Values of the Measures for
25 Systems (5 of 5)

PRC0	SW81	SW82	SW83	SW84	SW85	SW86	SW87	SW88	SW89	SW90
0100	88	219	145	246	917	400	662	112	247	38
0200	76	189	100	199	900	402	527	105	167	51
0300	54	144	72	156	898	373	501	109	148	63
0400	68	171	71	126	923	399	416	74	172	57
0500	92	245	133	236	918	377	541	70	166	49
0600	76	180	79	171	848	423	441	95	211	41
0700	73	184	66	148	886	395	360	80	129	36
0800	82	278	110	134	807	294	397	48	196	50
0900	85	221	108	193	932	384	487	87	208	50
1000	71	195	86	145	901	363	441	74	202	58
1100	72	164	67	132	943	437	407	80	215	60
9000	77	203	92	163	919	381	455	80	206	54
0610	81	188	88	185	839	430	466	98	215	42
0620	67	159	79	176	884	423	497	111	214	41
0630	55	144	44	101	877	380	304	70	225	38
0631	46	116	31	89	877	398	266	77	207	35
0632	69	195	81	118	876	352	415	60	260	45
0710	72	168	51	130	931	431	305	78	163	40
0720	93	202	124	254	914	464	613	126	196	50
0730	56	154	64	162	917	360	411	105	118	36
0740	81	352	108	114	866	231	307	32	176	33
0750	98	208	82	119	999	469	394	57	163	40
0760	74	161	59	141	945	462	364	87	196	50
0770	74	259	42	101	783	285	162	39	207	35
0780	63	214	50	105	693	293	235	49	234	49

Table A.7.2-3. Code Breakdown: Summary Statistics for 11 Projects (1 of 2)

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
SW01	COMP SN	0	7200	103	128	346	527	805	377.5	232.8	144.7	610.2
SW02	COMP SE	0	1800	0	3	29	45	94	30.5	28.7	1.8	59.3
SW03	COMP SS	0	3600	0	21	65	109	162	64.5	50.7	13.9	115.2
SW04	COMP SO	0	5400	7	39	77	127	319	99.7	87.6	12.1	187.4
SW05	COMP ST	0	7200	113	394	541	732	1095	572.3	301.7	270.5	874.0
SW06	MOD SN	0	4800	44	83	153	219	340	158.5	90.7	67.9	249.2
SW07	MOD SE	0	1200	0	3	20	30	67	21.7	21.6	0.1	43.3
SW08	MOD SS	0	2400	0	19	26	56	113	42.1	33.4	8.7	75.5
SW09	MOD SO	0	3600	7	23	58	110	206	78.3	64.7	13.5	143.0
SW10	MOD ST	0	4800	93	182	303	413	509	300.6	140.5	160.1	441.1
SW11	LOCLOLN	0	60000	0	0	179	344	1428	284.6	433.9	-149.3	718.5
SW12	LOCLOLE	0	15000	0	0	0	0	708	64.4	213.5	-149.1	277.8
SW13	LOCLOLS	0	30000	0	0	506	1003	1148	454.8	447.1	7.7	901.9
SW14	LOCLOLO	0	45000	26	301	506	1233	13623	1845.1	3937.7	-2092.6	5782.8
SW15	LOCLOLT	0	60000	26	1157	1675	2016	14147	2648.9	3888.5	-1239.6	6537.4
SW16	LOCMOLN	0	60000	0	3516	7279	10873	22188	8059.9	5830.2	2229.7	13890.2
SW17	LOCMOLE	0	15000	0	0	0	598	2155	371.6	669.6	-298.0	1041.2
SW18	LOCMOLS	0	30000	0	0	0	1141	2148	521.5	715.8	-194.3	1237.4
SW19	LOCMOLD	0	45000	0	0	0	7	3748	681.2	1513.8	-832.6	2195.0
SW20	LOCMOLT	0	60000	0	7279	8421	12348	23400	9634.9	6228.6	3406.3	15863.5
SW21	LOCHOLN	0	240000	7797	14826	31771	42157	66654	33668.8	19735.2	13933.6	53404.1
SW22	LOCHOLE	0	60000	0	125	7811	9935	15458	6286.0	5506.0	780.0	11792.0
SW23	LOCHOLS	0	120000	0	3000	5287	8089	17968	6587.5	5265.9	1321.5	11853.4
SW24	LOCHOLO	0	180000	281	3514	7469	11383	44688	9710.6	12359.6	-2648.9	22070.2
SW25	LOCHOLT	0	240000	13740	42641	56074	77632	96481	56252.9	26451.3	29801.6	82704.2
SW26	LOCN	0	240000	11239	14826	38669	49677	87719	42013.4	24948.3	17065.0	66961.7
SW27	LOCE	0	60000	0	125	7811	10837	15458	6722.0	5715.1	1006.9	12437.1
SW28	LOCS	0	120000	0	3506	6950	10124	20257	7563.8	5790.3	1773.5	13354.1
SW29	LOCO	0	180000	307	3829	7919	13390	49422	12237.5	13831.7	-1594.2	26069.3
SW30	LOCT	0	240000	15258	52994	68554	91514	115801	68536.7	32832.9	35703.8	101369.6
SW31	EXLOLN	0	30000	0	0	94	130	623	113.1	179.8	-66.7	292.9
SW32	EXLOLE	0	7500	0	0	0	0	164	14.9	49.4	-34.5	64.4
SW33	EXLOLS	0	15000	0	0	238	259	519	197.4	187.0	10.4	384.3
SW34	EXLOLO	0	22500	26	132	373	578	7303	953.4	2116.7	-1163.4	3070.1
SW35	EXLOLT	0	30000	26	551	708	807	7601	1278.7	2119.4	-840.7	3398.1
SW36	EXMOLN	0	30000	0	3285	6704	10191	17052	6958.8	4696.9	2261.9	11655.7
SW37	EXMOLE	0	7500	0	0	0	512	1844	328.2	584.0	-255.8	912.2
SW38	EXMOLS	0	15000	0	0	0	979	1785	417.7	599.9	-182.2	1017.7
SW39	EXMOLD	0	22500	0	0	0	7	3498	634.5	1410.1	-775.5	2044.6
SW40	EXMOLT	0	30000	0	6704	7691	11389	17967	8339.3	5074.6	3264.6	13413.9
SW41	EXHOLN	0	120000	2536	4341	8746	12122	21674	9741.9	6360.3	3381.6	16102.2
SW42	EXHOLE	0	30000	0	72	2339	3622	5014	2055.6	1887.7	167.9	3943.4
SW43	EXHOLS	0	60000	0	846	1767	2816	5858	2172.4	1801.0	371.3	3973.4
SW44	EXHOLD	0	90000	43	732	2868	4113	13789	3306.1	3852.0	-545.9	7158.1
SW45	EXHOLT	0	120000	4456	11075	16308	23980	29817	17276.0	8542.5	8733.5	25818.5

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Table A.7.2-3. Code Breakdown: Summary Statistics for 11 Projects (2 of 2)

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
SW46	EXLOCN	0	120000	4341	5915	15959	21917	38726	16822.9	10772.5	6050.4	27595.4
SW47	EXLOCE	0	30000	0	72	2559	4520	5353	2398.7	2083.8	314.9	4482.6
SW48	EXLOCS	0	60000	0	1179	2900	4601	7356	2787.5	2197.0	590.5	4984.4
SW49	EXLOCO	0	90000	69	1148	4100	5699	17637	4894.4	5135.2	-240.8	10029.5
SW50	EXLOCT	0	120000	4482	19759	26320	36136	48265	26903.5	13703.0	13200.5	40606.4
SW51	DECISONN	0	48000	699	1219	2386	3273	7062	2932.3	2125.3	806.9	5057.6
SW52	DECISONE	0	12000	0	15	807	1201	1331	627.5	536.6	90.8	1164.1
SW53	DECISONS	0	24000	0	335	455	849	1761	631.3	499.9	131.4	1131.1
SW54	DECISONO	0	36000	10	265	793	1555	4632	1096.8	1301.9	-205.1	2398.7
SW55	DECISONT	0	48000	1244	2845	5210	7142	10153	5287.8	2837.6	2450.2	8125.4
SW56	LCHANGEN	0	12000	241	419	1266	1886	2663	1340.3	810.9	529.3	2151.2
SW57	LCHANGE	0	9000	0	8	163	215	410	149.8	137.9	11.9	287.7
SW58	LCHANGES	0	6000	0	86	110	297	551	197.1	165.5	31.6	362.6
SW59	LCHANGED	0	3000	7	41	146	167	292	122.7	84.5	38.3	207.2
SW60	LCHANGET	0	12000	256	858	1746	2761	3458	1809.9	1052.1	757.8	2862.0
SW61	SCHANGEN	0	9000	138	325	1027	1581	2087	1071.2	668.9	402.3	1740.1
SW62	SCHANGEE	0	6750	0	5	136	186	318	127.1	113.0	14.1	240.1
SW63	SCHANGES	0	4500	0	55	89	189	407	140.5	120.4	20.0	260.9
SW64	SCHANGED	0	2250	0	3	27	41	97	29.0	29.7	-0.7	58.7
SW65	SCHANGET	0	9000	143	437	1399	1917	2642	1353.1	849.6	503.5	2202.7
SW66	SWERRSN	0	6000	35	91	314	388	524	277.5	152.3	125.2	429.9
SW67	SWERRSE	0	4500	0	1	26	57	78	31.5	27.9	3.6	59.5
SW68	SWERRSS	0	3000	0	17	27	54	77	33.9	23.0	10.9	56.9
SW69	SWERRSO	0	1500	0	1	8	11	30	7.7	8.6	-0.9	16.3
SW70	SWERRST	0	6000	36	129	406	499	561	346.4	179.8	166.6	526.2
SW71	PCOMNTSN	0	99	38	41	44	53	55	46.2	6.3	39.9	52.5
SW72	PCOMNTSE	0	99	0	43	54	60	70	45.7	23.8	21.9	69.5
SW73	PCOMNTSS	0	99	0	47	52	61	62	49.4	17.4	32.0	66.8
SW74	PCOMNTSO	0	99	35	52	57	66	73	56.9	10.2	46.7	67.1
SW75	PCOMNTST	0	99	43	45	50	55	56	49.6	4.8	44.8	54.5
SW76	ERRLOC	0	2500	167	351	575	735	778	516.3	206.7	309.6	723.0
SW77	ERRXLOC	0	5000	443	924	1411	1842	2080	1328.7	499.0	829.7	1827.7
SW78	ERRDECSN	0	3750	181	574	804	1077	2942	961.5	739.5	222.0	1700.9
SW79	ERRCOMP	0	167	24	46	57	77	104	61.5	24.8	36.7	86.4
SW80	ERRMOD	0	250	39	92	114	136	226	117.4	56.2	61.2	173.6
SW81	DECLOC	0	200	54	71	76	85	92	76.1	10.6	65.5	86.6
SW82	DECEXLOC	0	400	144	171	189	221	278	199.1	38.7	160.4	237.8
SW83	DECCOMP	0	200	66	71	86	110	145	94.3	27.2	67.0	121.5
SW84	DECMOD	0	300	126	134	156	199	246	171.5	41.8	129.7	213.2
SW85	RATIOEXP	0	999	807	886	901	923	943	897.5	39.4	858.2	936.9
SW86	EXLOCLOC	0	500	294	373	395	402	437	386.1	37.3	348.8	423.4
SW87	EXLOCOMP	0	667	360	407	441	527	662	470.9	85.1	385.8	556.0
SW88	EXLOCMOD	0	250	48	74	80	105	112	84.9	19.2	65.7	104.1
SW89	COMPCHNG	0	500	129	166	196	214	247	187.6	34.4	153.3	222.0
SW90	PERRCHNG	0	99	36	41	50	58	63	50.3	9.0	41.3	59.2

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NUMBER OF CLUSTERS	PRCD										
	0	0	0	0	0	1	0	0	0	0	1
	1	6	2	3	9	0	7	4	5	8	1
	0	0	0	0	0	0	0	0	0	0	0
11	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*	*****	*	*	*	*	*	*
9	*	*	*	*	*****	*	*	*	*	*****	*
8	*	*	*****	*****	*	*	*	*	*****	*	*
7	*	*	*****	*****	*	*	*	*	*****	*	*
6	*****	*****	*****	*****	*	*	*	*	*****	*	*
5	*****	*****	*****	*****	*	*	*	*	*****	*	*
4	*****	*****	*****	*****	*	*	*	*	*****	*	*
3	*****	*****	*****	*****	*	*	*	*	*****	*	*
2	*****	*****	*****	*****	*	*	*	*	*****	*	*
1	*****	*****	*****	*****	*	*	*	*	*****	*	*

Figure A.7.2-1. Code Breakdown: Cluster Map for 11 Projects

Table A.7.2-4. Code Breakdown: Summary Statistics for 20 Independent Systems
(1 of 2)

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
SW01	COMPSN	0	7200	10	76	129	341	602	205.9	172.7	33.2	378.6
SW02	COMPSE	0	1800	0	2	6	28	83	16.9	21.6	-4.6	38.5
SW03	COMPSS	0	3600	0	11	20	57	162	35.2	40.2	-5.0	75.4
SW04	COMPST	0	5400	2	7	23	70	319	54.1	77.5	-23.4	131.6
SW05	MODSN	0	7200	36	95	207	540	819	312.1	256.3	55.9	568.4
SW06	MODSE	0	4800	8	26	48	144	257	87.1	81.2	5.9	168.3
SW07	MODSS	0	1200	0	2	5	20	59	12.1	14.7	-2.6	26.8
SW08	MODSD	0	2400	0	5	18	29	113	23.0	26.3	-3.2	49.3
SW09	MODST	0	3600	0	7	17	53	206	42.3	57.5	-15.2	99.8
SW10	MODLN	0	4800	15	43	95	303	413	164.5	141.3	23.2	305.8
SW11	LOCLOLN	0	60000	0	0	0	188	1428	156.5	346.7	-190.1	503.2
SW12	LOCLOLE	0	15000	0	0	0	0	708	35.4	158.3	-122.9	193.7
SW13	LOCLOLS	0	30000	0	0	0	506	1148	250.1	378.2	-128.1	628.4
SW14	LOCLOLO	0	45000	0	0	285	506	13623	1014.8	3003.8	-1989.0	4018.6
SW15	LOCLOLT	0	60000	0	0	587	1637	14147	1456.9	3107.3	-1650.4	4564.2
SW16	LOCMDLN	0	60000	0	767	3063	7184	18071	4442.6	4553.2	-110.6	8995.9
SW17	LOCMDLE	0	15000	0	0	0	118	2155	204.4	517.1	-312.7	721.5
SW18	LOCMDLS	0	30000	0	0	0	452	2148	286.8	572.4	-285.6	859.3
SW19	LOCMDLO	0	45000	0	0	0	0	3748	375.0	1151.8	-776.8	1526.8
SW20	LOCMDLT	0	60000	0	767	3063	8400	18582	5308.9	5361.4	-52.5	10670.3
SW21	LOCMDLN	0	240000	1430	4446	8916	31297	66654	18427.4	18823.5	-396.1	37251.0
SW22	LOCMDLE	0	60000	0	179	935	8007	12056	3474.3	4135.8	-661.5	7610.1
SW23	LOCMDLS	0	120000	0	699	2190	5282	17968	3670.3	4319.0	-648.7	7989.3
SW24	LOCMDLO	0	180000	11	337	1752	7037	44688	5347.5	9954.5	-4607.0	15302.0
SW25	LOCMDLT	0	240000	2052	8268	14486	55773	96481	30919.5	28030.6	2888.9	58950.2
SW26	LOCN	0	240000	1430	5517	11738	38480	78955	23026.6	23086.3	-59.7	46113.0
SW27	LOCE	0	60000	0	179	1014	8379	13040	3714.1	4411.6	-697.5	8125.7
SW28	LOCS	0	120000	0	905	2190	6791	20257	4207.3	4891.0	-683.7	9098.3
SW29	LOCO	0	180000	11	337	1909	7883	49422	6737.3	11522.9	-4785.6	18260.2
SW30	LOCT	0	240000	2052	10060	16781	68248	115801	37685.3	34513.3	3172.1	72198.6
SW31	EXLOLN	0	30000	0	0	0	94	623	62.2	142.6	-80.4	204.8
SW32	EXLOLE	0	7500	0	0	0	0	164	8.2	36.7	-28.5	44.9
SW33	EXLOLS	0	15000	0	0	0	234	519	108.5	164.6	-56.1	273.2
SW34	EXLOLO	0	22500	0	0	134	263	5578	438.1	1226.0	-787.9	1664.1
SW35	EXLOLT	0	30000	0	0	300	675	5876	617.0	1287.5	-670.4	1904.5
SW36	EXMDLN	0	30000	0	670	2723	6358	14024	3827.3	3821.9	5.5	7649.2
SW37	EXMDLE	0	7500	0	0	0	95	1844	180.5	452.2	-271.7	632.7
SW38	EXMDLS	0	15000	0	0	0	243	1785	229.8	479.1	-249.3	708.8
SW39	EXMDLO	0	22500	0	0	0	0	3498	349.0	1073.0	-724.0	1422.0
SW40	EXMDLT	0	30000	0	670	2723	7631	15180	4586.6	4581.9	4.7	9168.5
SW41	EXMDLN	0	120000	392	1557	2541	8552	20145	5361.0	5620.1	-259.1	10981.2
SW42	EXMDLE	0	30000	0	90	322	2401	4196	1138.5	1352.8	-214.3	2491.4
SW43	EXMDLS	0	60000	0	136	794	1901	5858	1189.4	1420.0	-230.6	2609.5
SW44	EXMDLO	0	90000	0	143	452	2520	13789	1797.2	3191.0	-1393.8	4988.2
SW45	EXMDLT	0	120000	584	2993	4619	16267	29817	9486.3	8682.8	803.4	18169.1
SW46	EXMDLN	0	120000	392	2541	5247	15292	30959	9255.6	9312.1	-56.5	18567.7

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Table A.7.2-4. Code Breakdown: Summary Statistics for 20 Independent Systems
(1 of 2)

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
SW47	EXLOCE	0	30000	0	90	330	2552	4590	1327.3	1595.1	-267.9	2922.4
SW48	EXLOCS	0	60000	0	231	997	2222	7356	1527.8	1839.6	-311.8	3367.3
SW49	EXLOCO	0	90000	0	161	706	4404	17637	2584.5	4277.2	-1692.7	6861.7
SW50	EXLOCT	0	120000	584	4436	7283	25856	46271	14695.1	13689.9	1005.2	28385.0
SW51	DECISIONN	0	48000	71	427	747	2353	7062	1609.8	1859.5	-249.6	3469.3
SW52	DECISONE	0	12000	0	15	63	781	1201	347.0	430.5	-83.5	777.6
SW53	DECISIONS	0	24000	0	49	234	459	1761	345.1	417.4	-72.3	762.5
SW54	DECISIONO	0	36000	0	35	169	715	4632	592.9	1073.4	-480.5	1666.3
SW55	DECISONT	0	48000	151	711	1320	5027	10153	2894.9	2901.6	-6.7	5796.5
SW56	LCHANGEN	0	12000	38	192	427	1242	2422	738.5	719.5	19.0	1458.0
SW57	LCHANGE	0	9000	0	7	26	163	379	82.4	103.8	-21.4	186.2
SW58	LCHANGES	0	6000	0	26	69	113	551	106.9	129.4	-22.5	236.3
SW59	LCHANGEO	0	3000	2	10	25	134	292	66.6	81.2	-14.6	147.8
SW60	LCHANGET	0	12000	104	264	593	1712	3233	994.4	940.3	54.1	1934.7
SW61	SCHANGEN	0	9000	28	130	324	998	2045	591.2	611.2	-20.0	1202.4
SW62	SCHANGEE	0	6750	0	5	20	143	298	69.8	87.6	-17.9	157.4
SW63	SCHANGES	0	4500	0	16	52	88	407	76.0	94.8	-18.8	170.9
SW64	SCHANGEO	0	2250	0	1	4	25	97	15.8	25.0	-9.2	40.8
SW65	SCHANGET	0	9000	64	159	413	1313	2642	744.8	759.7	-14.9	1504.4
SW66	SWERRSN	0	6000	5	28	89	311	524	151.3	154.5	-3.3	305.8
SW67	SWERRSE	0	4500	0	1	5	37	58	17.3	21.5	-4.2	38.7
SW68	SWERRSS	0	3000	0	4	14	27	63	18.0	17.9	0.1	35.9
SW69	SWERRSO	0	1500	0	0	1	8	30	4.1	7.1	-3.0	11.3
SW70	SWERRST	0	6000	12	39	111	402	561	188.3	180.5	7.8	368.8
SW71	PCOMNTSH	0	99	22	38	44	52	58	43.9	8.6	35.4	52.5
SW72	PCOMNTSE	0	99	0	25	45	60	70	39.4	23.7	15.7	63.2
SW73	PCOMNTSS	0	99	0	39	49	61	64	43.5	21.1	22.4	64.6
SW74	PCOMNTSO	0	99	18	50	56	68	76	55.8	14.3	41.5	70.1
SW75	PCOMNTST	0	99	36	43	47	54	64	47.7	7.3	40.4	55.0
SW76	ERRLOC	0	2500	167	355	517	728	903	521.1	214.9	306.2	736.0
SW77	ERRXLOC	0	5000	443	938	1197	1806	3080	1408.0	693.2	714.9	2101.2
SW78	ERRDECSN	0	3750	181	439	746	1069	2942	868.5	603.2	265.3	1471.7
SW79	ERRCOMP	0	167	24	37	50	69	104	54.3	21.7	32.6	76.0
SW80	ERRMOD	0	250	32	73	102	135	226	108.3	49.4	58.9	157.7
SW81	DECLOC	0	200	54	67	74	84	98	75.0	12.7	62.4	87.7
SW82	DECEXLOC	0	400	144	162	192	221	352	202.1	51.5	150.6	253.6
SW83	DECCOMP	0	200	42	60	81	108	145	84.1	30.0	54.1	114.1
SW84	DECMDD	0	300	101	120	143	191	254	157.6	47.8	109.8	205.5
SW85	RATIOEXP	0	999	693	869	908	929	999	889.3	67.2	822.1	956.6
SW86	EXLOCLOC	0	500	231	361	382	431	469	381.7	64.8	316.9	446.5
SW87	EXLOCOMP	0	667	162	321	409	500	662	420.6	122.9	297.7	543.6
SW88	EXLOCMOD	0	250	32	60	79	105	126	80.3	26.6	53.7	106.9
SW89	COMPCING	0	500	118	166	196	215	247	191.4	31.7	159.7	223.1
SW90	PERRCHNG	0	99	33	39	49	51	63	46.5	8.8	37.7	55.3

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NUMBER OF CLUSTERS	PRCO																			
	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0
	1	6	2	3	9	0	4	5	6	6	7	8	7	7	1	7	7	7	7	7
	0	1	0	0	0	0	0	0	2	3	6	0	1	2	0	4	5	7	8	3
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
19	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
18	*	*	*	*	*	*	*	*	*****	*	*	*	*	*	*	*	*	*****	*	*
17	*	*	*	*	*	*	*	*	*****	*	*	*	*	*	*****	*	*	*****	*	*
16	*	*	*	*	*	*	*	*	*****	*	*	*	*	*	*****	*	*	*****	*	*
15	*	*	*	*	*	*	*	*	*****	*	*	*	*	*	*****	*	*	*****	*	*
14	*	*	*	*	*	*	*	*	*****	*	*	*	*	*	*****	*	*	*****	*	*
13	*	*	*	*	*	*	*	*	*****	*	*	*	*	*	*****	*	*	*****	*	*
12	*	*	*	*	*****	*	*	*	*****	*	*	*	*	*	*****	*	*	*****	*	*
11	*	*	*	*	*****	*	*	*	*****	*	*	*	*	*	*****	*	*	*****	*	*
10	*	*	*	*	*****	*	*	*	*****	*	*	*	*	*	*****	*	*	*****	*	*
9	*	*	*****	*	*****	*	*	*	*****	*	*	*	*	*	*****	*	*	*****	*	*
8	*	*	*****	*	*****	*	*	*	*****	*	*	*	*	*	*****	*	*	*****	*	*
7	*	*	*****	*	*****	*	*	*	*****	*	*	*	*	*	*****	*	*	*****	*	*
6	*****	*	*****	*	*****	*	*	*	*****	*	*	*	*	*	*****	*	*	*****	*	*
5	*****	*	*****	*	*****	*	*	*	*****	*	*	*	*	*	*****	*	*	*****	*	*
4	*****	*	*****	*	*****	*	*	*	*****	*	*	*	*	*	*****	*	*	*****	*	*
3	*****	*	*****	*	*****	*	*	*	*****	*	*	*	*	*	*****	*	*	*****	*	*
2	*****	*	*****	*	*****	*	*	*	*****	*	*	*	*	*	*****	*	*	*****	*	*
1	*****	*	*****	*	*****	*	*	*	*****	*	*	*	*	*	*****	*	*	*****	*	*

Figure A.7.2-2. Code Breakdown: Cluster Map for 20 Independent Systems

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Table A.7.2-5. Code Breakdown: Summary Statistics for 9 Large Systems (1 of 2)

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
SW01	COMPSN	0	7200	128	244	346	473	602	355.6	148.0	207.6	503.5
SW02	COMPSE	0	1800	0	16	29	43	83	32.3	24.1	8.2	56.4
SW03	COMPSS	0	3600	19	26	65	88	162	63.4	45.7	17.7	109.1
SW04	COMPSO	0	5400	10	43	74	147	319	105.1	93.7	11.4	198.8
SW05	COMPST	0	7200	295	415	511	716	819	556.4	169.6	386.8	726.1
SW06	MODSN	0	4800	25	83	153	236	257	150.4	82.7	67.7	233.1
SW07	MODSE	0	1200	0	12	20	28	59	22.2	16.6	5.6	38.9
SW08	MODSS	0	2400	19	23	30	49	113	41.8	29.1	12.6	70.9
SW09	MODSO	0	3600	10	28	58	136	206	81.6	67.7	13.9	149.2
SW10	MODST	0	4800	116	200	303	401	413	296.0	105.2	190.8	401.2
SW11	LOCL0LN	0	60000	0	0	191	521	1428	322.4	474.8	-152.4	797.3
SW12	LOCL0LE	0	15000	0	0	0	0	708	78.7	236.0	-157.3	314.7
SW13	LOCL0LS	0	30000	0	0	506	933	1148	478.7	449.2	29.5	927.9
SW14	LOCL0LO	0	45000	0	288	471	1454	13623	2106.4	4351.6	-2245.2	6458.1
SW15	LOCL0LT	0	60000	471	1195	1675	2493	14147	2986.2	4239.8	-1253.6	7226.0
SW16	LOCM0LN	0	60000	3516	5727	7279	9605	18071	8235.6	4215.2	4020.4	12450.7
SW17	LOCM0LE	0	15000	0	0	0	750	2155	436.8	722.4	-285.6	1159.1
SW18	LOCM0LS	0	30000	0	0	228	1149	2148	577.8	756.5	-178.7	1334.3
SW19	LOCM0LO	0	45000	0	0	0	1873	3748	832.6	1650.1	-817.5	2482.6
SW20	LOCM0LT	0	60000	5189	7486	8421	12965	18582	10082.7	4411.5	5671.1	14494.2
SW21	LOCH0LN	0	240000	5853	18691	31771	45609	66654	33160.7	18908.1	14552.5	52368.8
SW22	LOCH0LE	0	60000	0	2957	8072	9293	12056	6778.3	4024.5	2753.9	10802.8
SW23	LOCH0LS	0	120000	3000	3797	5287	8033	17968	7002.1	4550.5	2451.6	11552.6
SW24	LOCH0LO	0	180000	624	3017	7469	11375	44688	10553.7	13326.9	-2773.2	23880.5
SW25	LOCH0LT	0	240000	28081	45398	56074	67923	96481	57794.8	19104.3	38690.4	76899.1
SW26	LOCN	0	240000	11042	23677	38669	58405	78955	42018.7	22357.2	19661.5	64375.8
SW27	LOCE	0	60000	0	4034	8568	9754	13040	7293.8	4231.8	3061.9	11525.6
SW28	LOCS	0	120000	3506	4463	6950	9370	20257	8058.6	5054.5	3004.1	13113.1
SW29	LOCO	0	180000	893	4233	7919	17172	49422	13492.7	14810.0	-1317.3	28302.7
SW30	LOCT	0	240000	33741	54999	68554	83028	115801	70863.7	23230.8	47632.9	94094.5
SW31	EXL0LN	0	30000	0	0	94	153	623	124.4	198.3	-73.9	322.8
SW32	EXL0LE	0	7500	0	0	0	0	164	18.2	54.7	-36.4	72.9
SW33	EXL0LS	0	15000	0	0	168	366	519	197.0	198.4	-1.4	395.4
SW34	EXL0LO	0	22500	120	134	269	643	5578	904.0	1764.7	-860.7	2668.7
SW35	EXL0LT	0	30000	244	542	707	999	5876	1243.7	1758.3	-514.7	3002.0
SW36	EXM0LN	0	30000	3285	4830	6704	9084	14024	7133.2	3288.3	3844.9	10421.5
SW37	EXM0LE	0	7500	0	0	0	705	1844	387.1	629.8	-242.7	1016.9
SW38	EXM0LS	0	15000	0	0	117	987	1785	462.2	642.7	-180.5	1104.9
SW39	EXM0LO	0	22500	0	0	0	1740	3498	775.2	1537.2	-761.9	2312.4
SW40	EXM0LT	0	30000	4652	6871	7691	11176	15180	8757.8	3558.4	5199.4	12316.2
SW41	EXH0LN	0	120000	1677	4514	8746	14356	20145	9596.6	6045.3	3551.3	15641.8
SW42	EXH0LE	0	30000	0	876	2422	3091	4196	2157.7	1401.8	755.8	3559.5
SW43	EXH0LS	0	60000	846	1079	1945	2716	5858	2249.7	1521.5	728.1	3771.2
SW44	EXH0LO	0	90000	138	656	2868	4617	13789	3538.9	4199.5	-660.6	7738.4
SW45	EXH0LT	0	120000	7241	13212	16308	21951	29817	17542.8	6608.7	10934.0	24151.5
SW46	EXLOCN	0	120000	5915	8915	15959	24785	30959	16854.2	9130.9	7723.3	25985.1

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Table A.7.2-5. Code Breakdown: Summary Statistics for 9 Large Systems (2 of 2)

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
SW47	EXLOCE	0	30000	0	1282	2559	3987	4590	2563.0	1630.4	932.6	4193.4
SW48	EXLOCS	0	60000	1179	1362	2242	3809	7356	2908.9	1982.3	926.5	4891.2
SW49	EXLOC0	0	90000	273	915	4820	7073	17637	5218.1	5371.6	-153.5	10589.8
SW50	EXLOCT	0	120000	12137	21349	26320	33643	46271	27544.2	9983.8	17560.4	37528.0
SW51	DECISONN	0	48000	446	1597	2386	4383	7062	2944.4	2100.9	843.5	5045.4
SW52	DECISONE	0	12000	0	264	807	1049	1201	687.3	434.4	252.9	1121.8
SW53	DECISONS	0	24000	335	346	475	811	1761	653.3	456.2	197.1	1109.5
SW54	DECISONO	0	36000	47	226	793	1505	4632	1187.6	1409.2	-221.7	2596.8
SW55	DECISONT	0	48000	1875	3596	5110	7159	10153	5472.7	2486.2	2986.5	7958.9
SW56	LCHANGEN	0	12000	363	757	1266	1921	2422	1337.9	682.8	655.1	2020.7
SW57	LCHANGE	0	9000	0	74	163	211	379	160.3	110.2	50.1	270.6
SW58	LCHANGES	0	6000	70	87	114	246	551	193.4	152.5	41.0	345.9
SW59	LCHANGE0	0	3000	14	58	146	178	292	130.6	84.4	46.1	215.0
SW60	LCHANGET	0	12000	805	1057	1746	2409	3233	1822.2	811.0	1011.2	2633.2
SW61	SCHANGEN	0	9000	290	562	1027	1600	2045	1094.8	592.5	502.3	1687.3
SW62	SCHANGE	0	6750	0	58	145	186	298	137.6	90.4	47.1	228.0
SW63	SCHANGES	0	4500	51	58	89	178	407	138.7	112.8	25.9	251.5
SW64	SCHANGEO	0	2250	3	7	27	47	97	32.8	29.8	3.0	62.6
SW65	SCHANGET	0	9000	437	768	1399	1884	2642	1385.9	712.5	673.4	2098.4
SW66	SWERRSN	0	6000	86	164	314	352	524	285.9	136.2	149.7	422.0
SW67	SWERRSE	0	4500	0	15	41	55	58	34.3	21.3	13.0	55.6
SW68	SWERRSS	0	3000	16	21	27	48	63	33.0	16.2	16.8	49.2
SW69	SWERRSD	0	1500	1	2	8	11	30	8.8	8.8	-0.0	17.6
SW70	SWERRST	0	6000	129	239	405	419	561	356.7	134.1	222.6	490.8
SW71	PCOMNTSN	0	99	37	40	49	53	55	46.8	7.0	39.8	53.8
SW72	PCOMNTSE	0	99	0	45	58	60	62	48.9	19.5	29.4	68.4
SW73	PCOMNTSS	0	99	46	51	59	62	62	56.0	6.2	49.8	62.2
SW74	PCOMNTSO	0	99	35	51	55	63	68	55.1	9.9	45.2	65.0
SW75	PCOMNTST	0	99	42	48	54	55	56	51.4	4.7	46.7	56.2
SW76	ERRLOC	0	2500	167	401	516	742	778	530.8	202.9	327.9	733.7
SW77	ERREXLOC	0	5000	443	993	1434	1908	2080	1388.1	533.2	854.9	1921.3
SW78	ERRDECSN	0	3750	181	482	676	1041	1445	767.7	385.2	382.5	1152.9
SW79	ERRCOMP	0	167	24	52	59	88	104	66.3	24.8	41.5	91.1
SW80	ERRMOD	0	250	43	95	130	173	226	130.6	55.6	75.0	186.1
SW81	DECL0C	0	200	54	62	76	87	92	74.4	13.6	60.9	88.0
SW82	DECEXLOC	0	400	144	166	189	220	245	192.6	32.3	160.2	224.9
SW83	DECCOMP	0	200	64	71	88	121	145	96.2	28.2	68.0	124.4
SW84	DECMOD	0	300	124	151	185	218	246	182.9	40.7	142.2	223.6
SW85	RATIOEXP	0	999	839	899	917	921	932	905.0	27.3	877.7	932.3
SW86	EXLOCLOC	0	500	360	368	377	401	430	385.0	22.2	362.8	407.2
SW87	EXLOCCOMP	0	667	392	426	487	534	662	492.0	81.0	411.0	573.0
SW88	EXLOCMOD	0	250	69	72	98	107	112	92.1	17.4	74.7	109.5
SW89	COMPCNG	0	500	118	157	172	212	247	182.6	39.1	143.5	221.6
SW90	PERRCHNG	0	99	36	40	50	58	63	49.3	9.2	40.1	58.6

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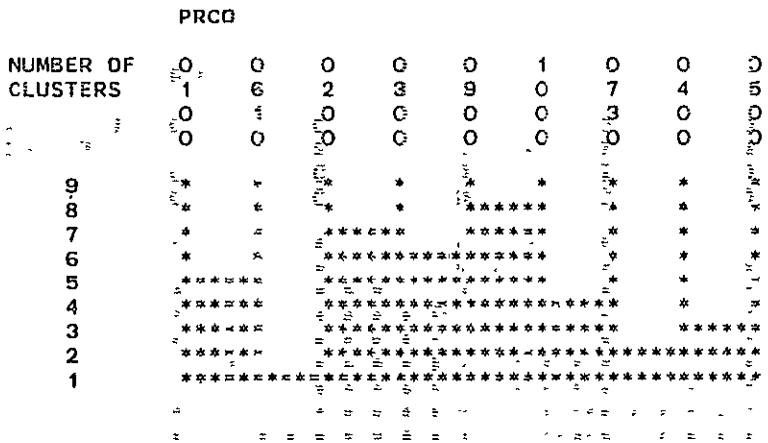


Figure A.7.2-3. Code Breakdown: Cluster Map for 9 Large Systems

Table A.7.2-6. Code Breakdown: Summary Statistics for 11 Small Systems (1 of 2)

CODE	NAME	-ALLOWED-RANGE		-ACTUAL-RANGE-					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
SW01	COMPSN	0	7200	10	42	81	124	182	83.5	49.8	33.7	133.3
SW02	COMPSE	0	1800	0	0	3	5	20	4.4	5.7	-1.3	10.0
SW03	COMPSS	0	3600	0	0	15	17	27	12.1	9.7	2.4	21.8
SW04	COMPSO	0	5400	2	3	7	20	39	12.4	11.5	0.8	23.9
SW05	COMPST	0	7200	36	55	111	187	224	112.3	64.3	48.0	176.6
SW06	MODSN	0	4800	8	13	34	46	83	35.3	22.3	13.0	57.5
SW07	MODSE	0	1200	0	0	3	5	17	3.8	4.8	-1.0	8.6
SW08	MODSS	0	2400	0	0	6	17	19	7.7	7.8	-0.0	15.5
SW09	MODSO	0	3600	0	3	7	13	33	10.2	9.5	0.7	19.7
SW10	MODST	0	4800	15	38	52	88	96	56.9	28.0	28.9	84.9
SW11	LOCLOLN	0	60000	0	0	0	0	179	20.8	54.6	-33.7	75.4
SW12	LOCLOLE	0	15000	0	0	0	0	0	0.0	0.0	0.0	0.0
SW13	LOCLOLS	0	30000	0	0	0	0	508	63.2	157.8	-94.7	221.0
SW14	LOCLOLO	0	45000	0	0	0	301	506	121.6	209.7	-88.0	331.3
SW15	LOCLOLT	0	60000	0	0	0	488	1063	205.6	370.5	-164.9	576.2
SW16	LOCMOLN	0	60000	0	0	1395	2539	3263	1339.4	1278.9	60.4	2618.3
SW17	LOCMOLE	0	15000	0	0	0	0	157	14.3	47.3	-33.1	61.6
SW18	LOCMOLS	0	30000	0	0	0	0	537	48.8	161.9	-113.1	210.7
SW19	LOCMOLD	0	45000	0	0	0	0	7	0.6	2.1	-1.5	2.7
SW20	LOCMOLT	0	60000	0	0	1395	2568	3263	1403.1	1324.5	78.6	2727.6
SW21	LOCHOLN	0	240000	1430	1579	6750	9161	14826	6127.5	4170.1	1957.5	10297.6
SW22	LOCHOLE	0	60000	0	0	359	849	4529	771.0	1295.8	-524.8	2066.8
SW23	LOCHOLS	0	120000	0	0	892	1947	2331	944.3	843.3	101.0	1787.5
SW24	LOCHOLD	0	180000	11	281	365	1256	3822	1087.9	1356.2	-268.3	2444.1
SW25	LOCHOLT	0	240000	2052	5204	8453	12127	15232	8930.7	4355.5	4575.3	13286.2
SW26	LOCN	0	240000	1430	2942	9289	11239	14826	7487.7	4749.2	2738.5	12237.0
SW27	LOCE	0	60000	0	0	359	1006	4529	785.3	1297.6	-512.3	2082.8
SW28	LOCS	0	120000	0	0	944	1947	2331	1056.3	861.8	194.5	1918.1
SW29	LOCO	0	180000	11	283	365	1564	4118	1210.2	1460.4	-250.2	2670.5
SW30	LOCT	0	240000	2052	5204	10456	15258	17688	10539.5	5492.6	5046.9	16032.0
SW31	EXLOLN	0	30000	0	0	0	0	94	11.3	28.9	-17.6	40.1
SW32	EXLOLE	0	7500	0	0	0	0	0	0.0	0.0	0.0	0.0
SW33	EXLOLS	0	15000	0	0	0	0	259	36.2	84.9	-48.7	121.0
SW34	EXLOLO	0	22500	0	0	0	136	234	56.9	95.5	-38.6	152.4
SW35	EXLOLT	0	30000	0	0	0	275	523	104.4	183.0	-78.7	287.4
SW36	EXMOLN	0	30000	0	0	1051	2281	2862	1122.5	1104.1	18.4	2226.7
SW37	EXMOLE	0	7500	0	0	0	0	126	11.5	38.0	-26.5	49.4
SW38	EXMOLS	0	15000	0	0	0	0	435	39.5	131.2	-91.6	170.7
SW39	EXMOLD	0	22500	0	0	0	0	3	0.3	0.9	-0.6	1.2
SW40	EXMOLT	0	30000	0	0	1051	2281	2862	1173.8	1135.0	38.9	2308.8
SW41	EXHOLN	0	120000	392	600	2280	2545	4341	1895.6	1192.2	703.4	3087.9
SW42	EXHOLE	0	30000	0	0	192	389	1599	304.7	453.4	-148.7	758.2
SW43	EXHOLS	0	60000	0	0	182	598	1137	322.0	374.0	-52.0	696.0
SW44	EXHOLO	0	90000	0	43	168	384	1432	372.2	523.9	-151.7	896.0
SW45	EXHOLT	0	120000	584	1526	3370	4456	4719	2894.5	1446.2	1448.3	4340.8
SW46	EXLOCN	0	120000	392	1322	3983	4633	5322	3038.5	1891.8	1146.8	4930.3

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Table A.7.2-6. Code Breakdown: Summary Statistics for 11 Small Systems (2 of 2)

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
SW47	EXLOCE	0	30000	0	0	192	405	1599	316.2	457.4	-141.2	773.5
SW48	EXLOCS	0	60000	0	0	377	742	1137	397.7	405.5	-7.8	803.2
SW49	EXLOCO	0	90000	0	69	168	618	1662	429.7	571.2	-141.5	1000.9
SW50	EXLOCT	0	120000	584	1526	4482	6800	7726	4182.2	2486.3	1695.9	6668.5
SW51	DECISONN	0	48000	71	139	622	723	1219	517.9	351.8	166.1	869.7
SW52	DECISONE	0	12000	0	0	49	64	375	68.6	108.1	-39.4	176.7
SW53	DECISONS	0	24000	0	0	75	175	254	92.9	95.0	-2.1	187.9
SW54	DECISONO	0	36000	0	10	42	138	430	106.4	147.7	-41.3	254.0
SW55	DECISONT	0	48000	151	432	733	1244	1371	785.8	421.6	364.2	1207.4
SW56	LCHANGEN	0	12000	38	143	209	419	519	248.1	150.5	97.5	398.6
SW57	LCHANGE	0	9000	0	0	11	19	99	18.6	28.4	-9.8	47.0
SW58	LCHANGES	0	6000	0	0	45	63	89	36.1	30.7	5.4	66.8
SW59	LCHANGED	0	3000	2	7	10	22	41	14.3	11.6	2.7	25.9
SW60	LCHANGET	0	12000	104	146	289	529	637	317.1	179.7	137.3	496.8
SW61	SCHANGEN	0	9000	28	89	138	325	382	179.2	118.6	60.6	297.8
SW62	SCHANGEE	0	6750	0	0	6	14	79	14.3	23.0	-8.7	37.2
SW63	SCHANGES	0	4500	0	0	30	46	62	24.8	22.2	2.6	47.0
SW64	SCHANGED	0	2250	0	0	1	3	7	1.9	2.3	-0.4	4.2
SW65	SCHANGET	0	9000	64	103	199	387	458	220.2	133.4	86.8	353.5
SW66	SWERRSN	0	6000	5	23	35	58	94	41.1	29.5	11.6	70.6
SW67	SWERRSE	0	4500	0	0	1	2	20	3.3	5.9	-2.6	9.2
SW68	SWERRSS	0	3000	0	0	5	11	17	5.7	5.6	0.2	11.3
SW69	SWERRSD	0	1500	0	0	0	1	1	0.4	0.5	-0.1	0.9
SW70	SWERRST	0	6000	12	25	47	65	112	50.5	33.8	16.8	84.3
SW71	PCOMNTSN	0	99	22	37	43	47	58	41.6	9.4	32.3	51.0
SW72	PCOMNTSE	0	99	0	0	36	49	70	31.7	24.9	6.8	56.6
SW73	PCOMNTSS	0	99	0	0	41	49	64	33.3	23.7	9.6	56.9
SW74	PCOMNTSO	0	99	18	42	61	71	76	56.4	17.6	38.7	74.0
SW75	PCOMNTST	0	99	36	39	45	47	64	44.6	7.8	36.8	52.4
SW76	ERRLOC	0	2500	226	268	518	706	903	513.2	233.7	279.5	746.9
SW77	ERREXLOC	0	5000	633	803	1143	1638	3080	1424.4	827.6	596.8	2251.9
SW78	ERRDECSN	0	3750	278	398	795	1126	2942	951.0	745.7	205.3	1696.7
SW79	ERRCOMP	0	167	30	32	45	50	72	44.5	12.7	31.7	57.2
SW80	ERRMOD	0	250	32	66	98	114	152	90.1	36.8	53.3	126.9
SW81	DECLOC	0	200	55	67	74	82	98	75.5	12.5	63.0	88.0
SW82	DECEXLOC	0	400	144	161	202	259	352	209.9	63.6	146.3	273.6
SW83	DECCOMP	0	200	42	50	67	108	124	74.2	28.9	45.3	103.1
SW84	DECMOD	0	300	101	105	130	141	254	137.0	44.5	92.5	181.5
SW85	RATIOEXP	0	999	693	807	884	943	999	876.5	87.1	789.4	963.7
SW86	EXLOCLOC	0	500	231	293	423	462	469	379.0	86.9	292.1	465.9
SW87	EXLOCOMP	0	667	162	304	364	407	613	362.3	123.0	239.3	485.3
SW88	EXLOCMOD	0	250	32	48	70	87	126	70.6	29.6	41.0	100.2
SW89	COMPCHNG	0	500	163	176	196	215	234	198.6	23.6	175.0	222.3
SW90	PERRCHNG	0	99	33	38	41	50	60	44.2	8.2	36.0	52.4

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NUMBER OF	0	0	0	0	0	0	1	0	0	0	0
CLUSTERS	6	6	7	8	7	7	1	7	7	7	7
	2	3	6	0	1	2	0	4	5	7	8
	0	0	0	0	0	0	0	0	0	0	0
11	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*	*	*	*	*	*	*	*
9	*****	*	*	*	*	*	*	*	*	*	*
8	*****	*	*	*	*	*	*	*	*	*	*
7	*****	*	*	*	*	*	*	*	*	*	*
6	*****	*	*	*	*	*	*	*	*	*	*
5	*****	*	*	*	*	*	*	*	*	*	*
4	*****	*	*	*	*	*	*	*	*	*	*
3	*****	*	*	*	*	*	*	*	*	*	*
2	*****	*	*	*	*	*	*	*	*	*	*
1	*****	*	*	*	*	*	*	*	*	*	*

Figure A.7.2-4. Code Breakdown: Cluster Map
for 11 Small Systems

A.7.3 ESTIMATED STATISTICS

- <u>X</u> -	Objective	- - -	Subjective
- <u>X</u> -	Absolute	- - -	Relative
- <u>X</u> -	Explicit	- - -	Derived
- <u>X</u> -	Static	- - -	Dynamic
- - -	Predictive	- <u>X</u> -	Explanatory

This category measures the development process and the development product. All these measures are objective, absolute, explicit, static, and explanatory at the end of the project. The only subjectivity in these measures is in the sense of how to count things. Estimates (dynamic) of the measures must be made for prediction. None of the measures is static until the end of the project.

The remainder of this subsection contains tables and figures that describe the Estimated Statistics measures with brief phrases, raw numbers, simple statistics, and graphics.

These tables and figures include

- Descriptions of the measures with code numbers, mnemonic names, acceptable values, and brief phrases (Table A.7.3-1)
- Values of the measures for 25 systems (Table A.7.3-2)
- Summary statistics for 11 projects (Table A.7.3-3)
- Cluster map for 11 projects (Figure A.7.3-1)
- Summary statistics for 20 independent systems (Table A.7.3-4)
- Cluster map for 20 independent systems (Figure A.7.3-2)
- Summary statistics for 9 large systems (Table A.7.3-5)
- Cluster map for 9 large systems (Figure A.7.3-3)

- Summary statistics for 11 small systems
(Table A.7.3-6)
- Cluster map for 11 small systems (Figure A.7.3-4)

Table A.7.3-1. Estimated Statistics: Description
of Measures

Code	Measure	Range		Description
		Low	High	
ES01	TOTCOMP	0000	7200	Number of Components Number of Modules
ES02	TOTMOD	0000	4800	Total
ES03	NEWMOD	0000	4800	New
ES04	MODMOD	0000	2400	Modified
ES05	COMPRUNS	000000	024000	Number of Computer Runs
ES06	CHANGES	000000	012000	Number of Source Code Changes
ES07	DOCPAGES	000000	013200	Number of Pages of Docu- mentation Number of Lines of Code
ES08	TOTLINES	000000	240000	Total
ES09	NEWLINES	000000	240000	New
ES10	MODLINES	000000	120000	Modified Number of Executable Statements
ES11	TOTEXST	000000	120000	Total
ES12	NEWEXST	000000	120000	New
ES13	MODEXST	000000	060000	Modified Work Hours in Tenths
ES14	PGRHRS	0000000	720000	Programmers
ES15	MGRHRS	0000000	240000	Managers
ES16	OTRHRS	0000000	240000	Other Services Computer Hours in Tenths
ES17	C95HRS	0000000	032000	IBM S/360-95
ES18	C75HRS	0000000	032000	IBM S/360-75
ES19	OCPUHRS	0000000	032000	Other

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Table A.7.3-2. Estimated Statistics: Values of the Measures
for 25 Systems

PRCD	ES01	ES02	ES03	ES04	ES05	ES06	ES07	ES08	ES09	ES10
0100	587	510	346	122	11976	3228	2473	111868	84729	20041
0200	355	283	200	21	6871	1649	1104	55237	43955	3506
0300	292	201	172	19	4604	1255	1613	50911	45345	4673
0400	638	535	337	31	7500	2107	1793	75393	49316	4252
0500	423	374	92	30	3033	858	1120	75420	20075	6727
0600	689	689	546	81	10283	3459	3017	110306	98388	7502
0700	851	604	409	84	7379	2761	2695	89513	61950	14297
0800	113	102	93	0	1589	255	763	15258	14873	0
0900	432	373	182	70	15017	2077	2107	67325	45004	9705
1000	444	391	216	65	14561	1575	2360	66266	44644	8606
1100	161	134	74	22	2467	541	760	17271	10822	2331
9000	1073	898	472	157	32045	4193	5227	150862	100470	20642
0610	639	519	418	59	7527	2710	2458	85369	76883	5652
0620	74	55	45	8	1476	219	255	10172	9627	527
0630	143	115	83	14	1283	530	366	14765	11878	1323
0631	101	74	44	14	548	275	300	9126	5354	1323
0632	42	41	39	0	735	255	66	5639	5540	0
0710	180	136	105	16	1395	660	527	14863	12227	1571
0720	113	100	71	7	1151	314	511	14282	9568	892
0730	245	148	72	29	2354	795	873	32822	18680	7838
0740	39	38	13	15	332	103	136	5497	2451	1947
0750	44	41	38	0	465	158	169	4525	4160	0
0760	114	63	39	17	856	300	284	9727	7350	2049
0770	35	23	23	0	221	135	61	2052	2052	0
0780	74	48	41	0	546	289	163	5204	4921	0

PRCD	ES11	ES12	ES13	ES14	ES15	ES16	ES17	ES18	ES19
0100	30959	2851	12461	128522	29078	43160	3113	1537	0
0200	15959	2422	4557	129299	23316	13780	1638	1563	0
0300	18165	0	1594	89115	36765	11090	2220	1595	0
0400	18956	142	11350	109565	35510	12310	2090	1930	0
0500	5915	2559	20654	41706	16209	10790	930	763	3
0600	38726	5353	4186	162646	38873	38190	4202	2654	1050
0700	21917	5014	9205	123143	28078	19265	1270	1825	0
0800	4341	72	69	31638	13022	11942	628	4	0
0900	11500	4520	10300	149476	45273	28462	6704	3169	0
1000	13292	3453	7720	134639	45328	32669	5381	2719	0
1100	5322	0	2404	34532	11800	6950	796	1009	0
9000	30114	7973	20424	318647	102401	68081	12881	6897	0
0610	30613	4590	2954	116586	27119	27444	3120	1852	0
0620	3983	248	190	16675	4986	5436	643	149	0
0630	4130	515	1042	29385	6768	5310	439	663	1050
0631	2154	515	1026	19205	6002	5276	227	566	0
0632	1976	0	16	10180	766	34	212	97	1050
0710	5172	192	1475	23035	6392	3381	263	323	0
0720	4633	405	1762	14023	1536	2349	139	344	0
0730	6329	2530	3278	35202	9091	5079	259	730	0
0740	418	255	553	7780	2269	2010	140	0	0
0750	2060	0	107	9775	3446	2417	123	73	0
0760	1651	1599	1296	10115	1290	1284	44	315	0
0770	392	192	0	5182	2290	1118	93	0	0
0780	1322	0	204	11166	1765	1627	215	14	0

Table A.7.3-3. Estimated Statistics: Summary Statistics for 11 Projects

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
ESO1	TOTCOMP	0	7200	113	292	432	638	851	453.2	224.5	228.7	677.7
ESO2	TOTMOD	0	4800	102	201	374	535	689	381.5	191.3	190.1	572.8
ESO3	NEWMOD	0	4800	74	93	200	346	546	242.5	149.7	92.8	392.1
ESO4	MODMOD	0	2400	0	21	31	81	122	49.5	37.1	12.4	86.7
ESO5	COMPRUNS	0	24000	1589	3033	7379	11976	15017	7752.7	4716.6	3036.1	12469.3
ESO6	CHANGES	0	12000	255	858	1649	2761	3459	1796.8	1054.3	742.5	2851.1
ESO7	DOCPAGES	0	13200	760	1104	1793	2473	3017	1800.5	792.6	1007.9	2593.0
ESO8	TOTLINES	0	240000	15258	50911	67325	89513	111868	66797.1	31755.9	35041.2	98552.9
ESO9	NEWLINES	0	240000	10822	20075	45004	61950	98388	47191.0	27166.5	20024.5	74357.5
ES10	MODLINES	0	120000	0	3506	6727	9705	20041	7421.8	5723.2	1698.6	13145.0
ES11	TOTEXST	0	120000	4341	5915	15959	21917	38726	16822.9	10772.5	6050.4	27595.4
ES12	NEWEXST	0	120000	0	72	2559	4520	5353	2398.7	2083.8	314.9	4482.6
ES13	MODEXST	0	60000	69	2404	7720	11350	20654	7681.8	5988.4	1693.4	13670.2
ES14	PGRHRS	0	720000	20800	41706	123143	134639	162646	101868.1	49290.5	52577.6	151158.6
ES15	MGRHRS	0	240000	1380	16209	29078	38873	45328	28439.3	13939.3	14500.0	42378.6
ES16	OTRHRS	0	240000	0	11090	13780	32669	43160	20150.7	13515.3	6635.4	33666.0
ES17	C95HRS	0	32000	628	930	2090	4202	6704	2633.8	2010.6	623.2	4644.4
ES18	C75HRS	0	32000	4	1009	1595	2654	3169	1706.2	919.9	786.2	2626.1
ES19	OCPUHRS	0	32000	0	0	0	0	1050	95.7	316.5	-220.8	412.2

	PRCO										
NUMBER OF CLUSTERS	0	0	0	0	1	0	0	0	0	0	1
	1	6	2	9	0	4	7	3	5	8	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
11	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*****	*	*	*	*	*	*	*
9	*	*	*	*****	*	*	*	*	*	*****	
8	*	*	*	*****	*****	*	*	*	*	*****	
7	*	*	*****	*****	*****	*	*	*	*	*****	
6	*****	*****	*****	*****	*****	*	*	*	*	*****	
5	*****	*****	*****	*****	*****	*	*	*	*	*****	
4	*****	*****	*****	*****	*****	*****	*	*	*	*****	
3	*****	*****	*****	*****	*****	*****	*****	*	*	*****	
2	*****	*****	*****	*****	*****	*****	*****	*****	*	*****	
1	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	

Figure A.7.3-1. Estimated Statistics: Cluster Map for 11 Projects

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Table A.7.3-4. Estimated Statistics: Summary Statistics for 20 Independent Systems

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
ES01	TOTCOMP	0	7200	35	84	171	430	639	257.3	205.6	51.6	462.9
ES02	TOTMOD	0	4800	23	57	135	374	535	209.4	177.1	32.4	386.5
ES03	NEWMOD	0	4800	13	42	88	196	418	133.0	117.4	15.6	250.4
ES04	MODMOD	0	2400	0	7	18	31	122	27.3	30.5	-3.3	57.8
ES05	COMPRUNS	0	24000	221	930	1972	7343	15017	4261.2	4762.6	-501.4	9023.8
ES06	CHANGES	0	12000	103	264	601	1631	3228	987.9	934.4	53.5	1922.3
ES07	DGCPAGES	0	13200	61	262	762	1748	2473	994.8	842.4	152.4	1837.2
ES08	TOTLINES	0	240000	2052	9838	16265	67060	111868	36711.3	33496.6	3214.8	70207.9
ES09	NEWLINES	0	240000	2052	7905	13550	44914	84729	25928.0	24872.7	1055.3	50800.7
ES10	MODLINES	0	120000	0	618	2190	6458	20041	4082.0	4846.0	-764.0	8928.0
ES11	TOTEXST	0	120000	392	2541	5247	15292	30959	9255.6	9312.1	-56.5	18567.7
ES12	NEWEXST	0	120000	0	90	330	2552	4590	1327.3	1595.1	-267.9	2922.4
ES13	MODEXST	0	60000	0	291	1678	6929	20654	4112.3	5424.0	-1311.8	9536.3
ES14	PGRHRS	0	720000	5182	11880	30512	114831	149476	55684.2	52275.3	3408.9	107959.5
ES15	MGRHRS	0	240000	1290	2274	7930	28588	45328	15641.6	15570.0	71.7	31211.6
ES16	OTRHRS	0	240000	0	2095	5373	13413	43160	11082.9	12303.3	-1220.4	23386.2
ES17	C95HRS	0	32000	44	159	636	2188	6704	1448.9	1864.7	-415.8	3313.6
ES18	C75HRS	0	32000	0	92	697	1587	3169	937.6	953.7	-16.1	1891.3
ES19	OCPUHRS	0	32000	0	0	0	0	1050	52.6	234.8	-182.1	287.4

	PRCD																			
NUMBER OF CLUSTERS	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
	1	6	2	4	3	9	0	5	6	7	1	6	7	8	7	7	7	7	7	7
	0	1	0	0	0	0	0	0	2	2	0	3	1	0	3	4	5	8	6	7
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
19	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
18	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
17	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
16	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
15	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
14	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
13	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
12	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
11	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
9	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
8	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
7	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
6	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
5	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
4	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
3	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
1	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

Figure A.7.3-2. Estimated Statistics: Cluster Map for 20 Independent Systems

Table A.7.3-5. Estimated Statistics: Summary Statistics for
9 Large Systems

CODE	NAME	-ALLOWED-RANGE		-----ACTUAL-RANGE-----					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
ES01	TOTCOMP	0	7200	245	324	432	613	639	450.6	144.5	306.1	595.0
ES02	TOTMOD	0	4800	148	242	374	515	535	370.4	139.2	231.3	509.6
ES03	NEWMOD	0	4800	72	132	200	342	418	226.1	117.7	108.4	343.8
ES04	MODMOD	0	2400	19	25	31	68	122	49.6	33.3	16.2	82.9
ES05	COMPRUNS	0	24000	2354	3819	7500	13269	15017	8160.3	4712.9	3447.4	12873.2
ES06	CHANGES	0	12000	795	1057	1649	2409	3228	1806.0	814.4	991.6	2620.4
ES07	DOCPAGES	0	13200	873	1112	1793	2409	2473	1766.8	625.0	1141.8	2391.8
ES08	TOTLINES	0	240000	32822	53074	67325	80395	111868	68956.8	22426.1	46530.7	91382.9
ES09	NEWLINES	0	240000	18680	32015	45004	63100	84729	47625.7	21985.3	25640.3	69611.0
ES10	MODLINES	0	120000	3506	4463	6727	9156	20041	7888.9	5007.8	2881.1	12896.6
ES11	TOTEXST	0	120000	5915	8915	15959	24785	30959	16854.2	9130.9	7723.3	25985.1
ES12	NEWEXST	0	120000	0	1282	2559	3987	4590	2563.0	1630.4	932.6	4193.4
ES13	MODEXST	0	60000	1594	3116	7720	11381	20654	8127.0	6005.6	2121.4	14132.6
ES14	PGRHRS	0	720000	35202	65411	116586	131969	149476	103790.0	40731.5	63058.5	144521.5
ES15	MGRHRS	0	240000	9091	19763	29078	41019	45328	29743.2	12374.1	17369.1	42117.3
ES16	QTRHRS	0	240000	5079	10940	13780	30566	43160	20531.6	12777.1	7754.4	33308.7
ES17	C95HRS	0	32000	259	1284	2220	4251	6704	2828.3	2068.8	759.5	4897.2
ES18	C75HRS	0	32000	730	1150	1595	2325	3169	1762.0	799.4	962.6	2561.4
ES19	OCPUHRS	0	32000	0	0	0	0	3	0.3	1.0	-0.7	1.3

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	PRCD									
NUMBER OF	0	0	0	0	0	0	1	0	0	
CLUSTERS	1	6	2	4	3	9	0	5	7	
	0	1	0	0	0	0	0	0	3	
	0	0	0	0	0	0	0	0	0	
9	*	*	*	*	*	*	*	*	*	
8	*	*	*	*	*	*	*	*	*	
7	*	*	*	*	*	*	*	*	*	
6	*	*	*	*	*	*	*	*	*	
5	*	*	*	*	*	*	*	*	*	
4	*	*	*	*	*	*	*	*	*	
3	*	*	*	*	*	*	*	*	*	
2	*	*	*	*	*	*	*	*	*	
1	*	*	*	*	*	*	*	*	*	

Figure A.7.3-3. Estimated Statistics: Cluster Map
for 9 Large Systems

Table A.7.3-6. Estimated Statistics: Summary Statistics
for 11 Small Systems

CODE	NAME	-ALLOWED-RANGE		-ACTUAL-RANGE-					AVERAGE	STD DEV	AVG-SD	AVG+SD
		LOW	HIGH	LOW	1ST Q	MEDIAN	3RD Q	HIGH				
ES01	TOTCOMP	0	7200	35	44	113	143	180	99.1	49.9	49.2	149.0
ES02	TOTMOD	0	4800	23	41	63	115	136	77.7	40.7	37.0	118.4
ES03	NEWMOD	0	4800	13	38	45	83	105	56.8	29.9	26.9	86.7
ES04	MODMOD	0	2400	0	0	8	16	22	9.0	8.2	0.8	17.2
ES05	COMPRUNS	0	24000	221	465	1151	1476	2467	1071.0	670.5	400.5	1741.5
ES06	CHANGES	0	12000	103	158	289	530	660	318.5	182.2	136.4	500.7
ES07	DOCPAGES	0	13200	61	163	284	527	763	363.2	245.9	117.3	609.1
ES08	TOTLINES	0	240000	2052	5204	10172	14863	17271	10328.7	5296.6	5032.1	15625.4
ES09	NEWLINES	0	240000	2052	4160	9568	11878	14873	8175.4	4286.0	3889.4	12461.3
ES10	MODLINES	0	120000	0	0	892	1947	2331	967.3	917.8	49.5	1885.0
ES11	TOTEXST	0	120000	392	1322	3983	4633	5322	3038.5	1891.8	1146.8	4930.3
ES12	NEWEXST	0	120000	0	0	192	405	1599	316.2	457.4	-141.2	773.5
ES13	MODEXST	0	60000	0	107	553	1475	2404	827.5	818.1	9.3	1645.6
ES14	PGRHRS	0	720000	5182	9775	14023	23035	31638	16324.9	8836.2	7488.7	25161.1
ES15	MGRHRS	0	240000	1290	1536	2290	6392	13022	4104.0	3565.6	538.4	7669.6
ES16	OTRHRS	0	240000	0	1284	2349	5310	11942	3352.2	3303.4	48.8	6655.6
ES17	C95HRS	0	32000	44	123	215	628	796	320.3	261.9	58.4	582.2
ES18	C75HRS	0	32000	0	4	149	344	1009	263.1	323.4	-60.3	586.5
ES19	OCPUHRS	0	32000	0	0	0	0	1050	95.5	316.6	-221.1	412.0

	PRCO										
NUMBER OF CLUSTERS	0	0	1	0	0	0	0	0	0	0	0
11	6	7	1	6	7	8	7	7	7	7	7
10	2	2	0	3	1	0	4	5	8	6	7
9	0	0	0	0	0	0	0	0	0	0	0
8	*	*	*	*	*	*	*	*	*	*	*
7	*	*	*	*	*	*	*	*	*	*	*
6	*	*	*	*	*	*	*	*	*	*	*
5	*	*	*	*	*	*	*	*	*	*	*
4	*	*	*	*	*	*	*	*	*	*	*
3	*	*	*	*	*	*	*	*	*	*	*
2	*	*	*	*	*	*	*	*	*	*	*
1	*	*	*	*	*	*	*	*	*	*	*

Figure A.7.3-4. Estimated Statistics: Cluster Map
for 11 Small Systems

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DOCUMENTS

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